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# Investigation and Outbreak Scenarios

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ELC Epidemiology Workshop 2018

# Why Conduct an Outbreak Investigation?



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- To determine the likely sources of exposure and mechanisms of transmission in order to eliminate them and prevent new exposures
- To determine risk factors for illness in order to mitigate those risks in the specific setting/location
- To identify the cause of the outbreak to help guide treatment and care for the remaining cases that have not fully recovered
- To document what occurred before and during the outbreak to decrease the time it takes to control or to prevent future outbreaks



# Which Outbreaks Should Be Investigated?



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- Characteristics that serve as a general guide to determine which outbreaks determine further investigation (not a comprehensive or definitive list):
  - ❖ Outbreaks of unknown etiology
  - ❖ Outbreaks associated with severe disease outcomes, such as death or hospitalization
  - ❖ Outbreaks for which identification of the causative agent or potential dual infections is needed, determined a priori
  - ❖ Outbreaks which may be useful to answer epidemiologic, laboratory or infection control questions
  - ❖ Outbreaks of possible vaccine-preventable diseases



# Which Outbreaks Should Be Investigated?

- Characteristics that serve as a general guide to determine which outbreaks determine further investigation (not a comprehensive or definitive list):
  - ❖ Outbreaks associated with institutional settings or with a likely (controllable) environmental source
  - ❖ Clusters of infection potentially caused by a bioterrorism agent
  - ❖ Outbreaks among a vulnerable population
  - ❖ Outbreaks which have generated excessive public anxiety
  - ❖ Outbreaks which are either very large or rapidly progressing



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# What is an Outbreak?

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- An outbreak is a localized increase in a disease, symptom or syndrome that clearly exceeds the expected level.
  - ❖ For rare diseases (e.g., measles, anthrax), a single case may be considered an outbreak.





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# Resources

- Use the Emerging Acute Infectious Disease Guideline when investigating an outbreak
  - <http://dshs.texas.gov/IDCU/investigation/Investigation-Guidance/>
- Notify DSHS- Emerging Acute Infectious Disease Branch (EAIDB) at (800) 252-8239 or 776-7676 about an outbreak



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## Emerging and Acute Infectious Disease Guidelines (EAIDG)

Infectious Disease Control Unit (IDCU)  
Emerging and Acute Infectious Disease Branch (EAIDB)  
Ph.: (512) 776-7676  
Fax: (512) 776-7616  
January 2018  
Stock No. 6-106

# Guidance/Resources for IRID Conditions Outbreaks



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- Complete and send the “Respiratory Disease Outbreak Summary Form” to the appropriate health department
  - Local Health Departments → Regional Health Department
  - Regional Health Department → EAIDB
    - EAIDB Fax Number: (512) 776-7616
    - Email to appropriate IRID Condition Contact
- For Respiratory/ILI/Flu Outbreak use Chapter VII. Outbreak of the Texas Influenza Surveillance Handbook for guidance
  - <http://www.dshs.state.tx.us/IDCU/disease/influenza/Texas-Influenza-Surveillance-Handbook.doc>



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# Foodborne: National Outbreak Reporting System (NORS)

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- For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
- The following should be reported to NORS:
  - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
  - Outbreaks as indicated above with patients in the same household.
- Enter outbreaks into NORS online reporting system at <https://wwn.cdc.gov/nors/login.aspx>
- Forms, training materials, and other resources are available at <http://www.cdc.gov/nors/>



# **SCENARIO 1**

# Scenario 1

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- You receive 5 lab reports of confirmed *Salmonella* from local clinics over the last week.
  - Do you think this is an outbreak?
  - What additional information might you want to know to determine if an outbreak is occurring?



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# Scenario 1- continued

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- Continue to receive *Salmonella* lab reports, including 4 from the local university health center
  - What epi investigation tools could you use to gather information and analyze info?
  - If you do suspect an outbreak, who would you notify, and why?
  - Why is it important to investigate?



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To be continued...

# **SCENARIO 2**

# Scenario 2

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**A hospital IP calls to report a suspect measles in a 10- month- old male**

**What are the first questions you ask?**

1. What are the symptoms? (expecting one of the 3 c's, fever, and rash)
2. Symptom onset dates?
3. Was the child exposed to someone who was sick or did they travel recently?
4. Were they vaccinated?
5. Has any lab testing been ordered?



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# Scenario 2- continued

## This is the information you gather:

- a. **Symptoms:** fever, runny nose, diarrhea, ear infection, rash
- b. **Symptom onsets:** fever (7/5/17), runny nose and diarrhea (7/7/17), rash (7/13/17)
- c. **Recent travel:** Greece for one week and Denmark for another week
- d. **Travel dates:** Greece (6/26/17-7/2/17) and Denmark (7/2/17-7/8/17).
- e. **Vaccination status:** Vaccinated due to anticipated travel (6/11/17)
- f. **Current location/ status:** Isolated at home
  - Hospitalized 7/8/17- 7/9/17 was in isolation on airborne precautions
- g. **Lab tests:** PCR collected at hospital but discarded due to lack of rash. No other testing for measles done at this point.



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# Scenario 2- continued

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What is the case status at this point?

- **Highly suspect case**

Why highly suspect?

- Even though the patient is vaccinated the symptoms, travel history, and age make this highly suspect.
- Symptoms (fever + rash + coryza)
- Travel to measles area



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# Scenario 2- continued

## You've received clinical information, now what?

1. Inform Central Office of the suspected case and send a summary of information known at this point.

We need to have laboratory confirmation. **What type of lab is best in this situation?**

- a. PCR!
2. Take a PCR and send to the Austin DSHS laboratory for testing
    - a. **Should the specimen be frozen? Cold? What type of swab should be taken?**
  3. Determine infectious period. **Why?**
    - a. If the patient was infectious while travelling, will have to initiate a DGMQ.
    - b. **What is the infectious period? Rash onset was 7/13.**
      - i. 7/9 – 7/17



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# Scenario 2- continued

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Do you start initiating control measures at this point?

- NO! We do not have IgM or PCR results at this point.
- However, beginning the steps of control measures is warranted due to the highly suspicious nature of the case.
- Assess vaccination status of household contacts and start determining all the locations where the patient was during the infectious period.



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# Scenario 2- continued

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**You've collected and shipped a specimen for measles PCR testing. You've determined that the household contacts are all vaccinated and have created a list of locations the patient visited while infectious.**

## Next Steps?

1. Wait for PCR results.



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# Scenario 2- continued

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**Measles PCR comes back negative.**

**What is the final case status?**

- NOT A CASE



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# SCENARIO 3

# Scenario 3

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1. A hospital IP calls to inquire about testing a 50-year-old male patient for MERS-coronavirus.
  
1. You ask the IP for more information on current illness and exposures:
  - a. Recent travel: Kuwait
  - b. Travel dates: unk date in early Sept – 9/22/18 (return flight)
  - c. Onset: 9/20/18
  - d. Symptoms: 103F fever, cough, SOB
  - e. Currently in ICU
  - f. Lab tests: Negative for flu (rapid test), *Legionella*, *S. pneumo*, RSV, parainfluenza
  - g. Pneumonia diagnosed from CXR



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# SCENARIO 4

# Scenario 4

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- DSHS EAIDB has notified you that the local HD in Scenario 1 has been investigating a cluster of *Salmonella* Newport infections and there are 4 cases in your jurisdiction with indistinguishable PFGE patterns.
- EAIDB has requested you interview cases with a cluster specific hypothesis-generating questionnaire, even if they have already been interviewed as part of a routine disease investigation.
- You are successful in setting up an interview with one of your cases.



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# Scenario 4- continued

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How would you prepare for the interview?

- Read through the interview form to familiarize yourself with any unusual words or items.
- Review the lab report and other medical records you may have received.
- Be prepared to answer questions from the case patient about prevention, common causes or exclusion criteria.
- Find a quiet place so you can conduct the interview undisturbed.



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# Scenario 4- continued

What are some things you can do to you maximize case-patient's recall during the interview?

Maximize the case-patient's recall

- Set the time frame of interest
  - Calendars are useful
  - Special events: holidays, parties, conferences, etc...
    - Was there a party at work, birthdays, public holidays..
    - Did they attend events – sports games, weddings...
    - What was served, what did they eat?
- Shopping records: receipts, credit/debit card statements, shopper card records, etc...
  - “Do you have any shopping records that could help us identify specific food purchase dates?”



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# Scenario 4- continued

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How can you optimize details and accuracy during the interview?

## Optimize details and accuracy

- Accurately record what people say
- Probe if answers are vague, but try not to lead
- Check as you proceed through the interview for inconsistencies
  - For example, case states no to spicy peppers, and then states that they ate jalapeno peppers



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# SCENARIO 5

# Scenario 5

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**You receive a lab report for IgM+ rubella from Quest.**

- Patient is a 29 year old woman

**You call the ordering provider and find out this woman is pregnant.**

**What should you ask now?**

1. Does the patient have any symptoms?
2. Why specifically was she tested? Did you suspect rubella?



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# VPD Scenario 5 -continued

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**The provider explains that they were testing for immunity since the woman was from out of the country and vaccination history was unknown. Patient does not have rash or fever and has been in the U.S. for a few years.**

**Do you suspect rubella? Do you request additional testing (i.e. swab for PCR)?**

No, we do not suspect rubella due to no exposure history and no symptoms. We do not require additional testing. Rubella IgM frequently comes back false positive.



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# Rubella IgM Cross-reactivity

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1. Rash and fever illnesses are more likely due to a number of other rash-causing illnesses such as parvovirus B19, enteroviruses such as coxsackieviruses and echoviruses, or human herpesvirus-6 (roseola).
2. It is important to distinguish IgM reactivity caused by primary infection from that caused by IgM persistence or cross-reactivity with other antigens, especially in pregnant women. Although routine IgM screening of pregnant women is not recommended, providers sometimes inappropriately order IgM tests.



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# **SCENARIO 6**

# Scenario 6



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- The following lab result appears in NBS

## Lab Reports (1)

Date Received	Provider/Reporting Facility	Date Collected	Test Results
<a href="#">05/03/2013</a> 9:25 AM E	Reporting Facility: LABCORP Ordering Provider: DANIEL HALL	04/29/2013	● Escherichia coli shiga-like: (Negative) - (Final) Positive

- What should you do? How would you proceed?



# Scenario 6- continued



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- The case reported diarrhea and severe stomach cramps with an onset on 2/14/14 and reported attending the local livestock show and rodeo.

## Lab Reports (1)

Date Received	Provider/Reporting Facility	Date Collected	Test Results
<a href="#">05/03/2013</a> 9:25 AM E	Reporting Facility: LABCORP Ordering Provider: DANIEL NALL	04/29/2013	● Escherichia coli shiga-like: (Negative) - (Final) Positive

- What is the case classification?

# Scenario 6- continued



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- Then you get this additional result from the DSHS lab on queue

Date Received	Provider/Reporting Facility	Date Collected	Test Results
<a href="#">01/18/2013</a> 10:49 AM E	Reporting Facility: LABCORP Ordering Provider: [REDACTED]	01/12/2013	● Escherichia coli shiga-like: (Negative) - (Final) Positive
<a href="#">01/30/2013</a> 9:22 AM E	Reporting Facility: TEXAS DSHS AUSTIN	01/12/2013	● ESCHERICHIA COLI SHIGA-LIKE IDENTIFIED: Positive

- Now, what is the case classification?



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# Scenario 6- continued

- What if instead you received this result?

Date Received	Provider/Reporting Facility	Date Collected	Test Results
<a href="#">07/08/2013</a> 9:08 AM E	Reporting Facility: LABCORP Ordering Provider: [REDACTED]	07/03/2013	● Escherichia coli shiga-like: Positive
<a href="#">07/19/2013</a> 9:08 AM E	Reporting Facility: TEXAS DSHS AUSTIN Ordering Provider: [REDACTED]	07/03/2013	● ESCHERICHIA COLI SHIGA-LIKE IDENTIFIED: Positive
<a href="#">07/19/2013</a> 9:09 AM E	Reporting Facility: TEXAS DSHS AUSTIN Ordering Provider: [REDACTED]	07/03/2013	● MICROORGANISM OR AGENT IDENTIFIED: L-1560F

- Now, what is the case classification?



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# Scenario 6- continued

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- Now going back to the case-patient:  
The confirmed case is a 3-year-old female who attends Sunnydale Day Care
- Should the child be excluded from daycare?



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# Scenario 6- continued

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- You have another *E. coli* O157:H7 lab confirmed case, a 24-year-old male, who upon interview, reports working in the kitchen at McDowell's
  - Should the employee be excluded from work?
  - When can the employee return to work?

# **SCENARIO 7**

# Scenario 7

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1. A hospital IP calls to report an influenza death in an 18-year-old female.
2. The IP tells you the following information about the patient's illness:
  - a. Illness onset: 1/1/18 (fever 101.2F, cough, myalgia)
  - b. Rapid test positive for flu A at PCP's office on 1/2/18
  - c. Hospitalized on 1/5/18
  - d. PCR test negative at hospital (collection date 1/6/18)
  - e. Date of death: 1/10/18



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# SCENARIO 8



# Scenario 8

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**You receive a call from an infection preventionist (IP) wanting to report a patient with acute limb weakness.**

**What four pieces of information do you need to ensure the IP is aware of and is completing for the suspected acute flaccid myelitis patient?**

1. AFM patient summary form
2. Medical Records listed on patient summary form
3. Specimens
  - Not required however if possible it is recommended
4. MRI images sent on a CD to the CDC



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# VPD Scenario 8- continued

The IP informs you the provider wants to send specimens for testing.

Where should the specimen be sent?

- DSHS Austin laboratory

What document is required to be sent with each specimen?

- Each specimen requires a completed G-2V form



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Medicaid, Medicare, private insurance, or DSHS Program	
<input type="checkbox"/> Medicaid (2)	<input type="checkbox"/> Medicare (8)
Medicaid/Medicare #:	
<input type="checkbox"/> Submitter (3)	<input type="checkbox"/> Private Insurance (4)
<input type="checkbox"/> BIDS (1720)	<input type="checkbox"/> TB Elimination (1019)
<input type="checkbox"/> BT Grant (1719)	<input type="checkbox"/> Title X (12)
<input type="checkbox"/> HIV / STD (1002)	<input type="checkbox"/> Title XX (13)
<input type="checkbox"/> IDEAS (1010)	<input type="checkbox"/> TX CLPPP (9)
<input type="checkbox"/> Immunizations (1009)	<input type="checkbox"/> Zoonosis (1020)
	<input type="checkbox"/> Other:

Section 3. SPECIMEN SOURCE OR TYPE	
<input type="checkbox"/> Abscess (site)	<input type="checkbox"/> Nasopharyngeal: <input type="checkbox"/> wash <input type="checkbox"/> swab <input type="checkbox"/> aspirate
<input checked="" type="checkbox"/> Blood	<input type="checkbox"/> Nasal Swab
<input type="checkbox"/> Bone marrow	<input type="checkbox"/> Nasal Wash
<input type="checkbox"/> Bronchial washings	<input type="checkbox"/> Oral fluid
<input type="checkbox"/> Buccal swab	<input type="checkbox"/> Rectal swab
<input type="checkbox"/> CSF	<input type="checkbox"/> Serum:
<input type="checkbox"/> Eye	Acute date: _____
<input type="checkbox"/> Feces/stool	Conv. date: _____
<input type="checkbox"/> Lesion (site)	<input type="checkbox"/> Sputum: Induced
<input type="checkbox"/> Lymph node (site)	<input type="checkbox"/> Sputum: Natural
	<input type="checkbox"/> Tissue (site)
	<input type="checkbox"/> Urethral
	<input type="checkbox"/> Urine
	<input type="checkbox"/> Vaginal
	<input type="checkbox"/> Wound (site)
	<input type="checkbox"/> Other:

Section 4. VIROLOGY
<input type="checkbox"/> Electron Microscopy
<input type="checkbox"/> Influenza surveillance (Influenza real-time RT-PCR) Vaccine received: <input type="checkbox"/> Yes <input type="checkbox"/> No Date vaccine received: _____ Travel history (if known): _____
<input type="checkbox"/> Measles, real-time RT-PCR
<input type="checkbox"/> Mumps, real-time RT-PCR
<input type="checkbox"/> MERS Coronavirus (Novel coronavirus) **** Prior authorization required. **** Call Infectious Disease (512) 776-7676 for authorization
<input checked="" type="checkbox"/> Other: Enterovirus (AFM testing)

# VPD Scenario 8- continued

**You submit the required forms and medical records to Central Office and the MRI CD to the CDC.**

**How long until you receive the CDC case status determination?**

- Currently it takes about a month for the CDC neurologists to review and make a determination

**How are you notified of the CDC case status determination?**

- The VPD team will forward you the email they receive from the CDC. Currently there is no formal documentation.



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# SCENARIO 9

# Scenario 9

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1. A hospital IP calls to report a *Vibrio* illness in a 57-year-old male, hospitalized with history of alcoholism, diabetes, and chronic liver failure.

a. What should you do? How would you proceed? What information do you need to know?



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# Scenario 9- continued

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1. An isolate was sent to the DSHS lab and identified as *Vibrio vulnificus*. Upon interview, the case-patients reported consumption of raw oysters on 08/06/13. Onset of symptoms was on 08/07/13.

a. What should you do? How would you proceed?

1. What if the case-patient reported consuming raw oysters at a restaurant in another jurisdiction?



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# **SCENARIO 10**

# Scenario 10

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**You receive a PCR positive lab report for *Bordetella pertussis* in a 2-month old.**

You conduct interview the mother of the patient and find out the infant has been coughing for 10 days and had apnea.

**What is the case status?**

- Probable

**Who should be prophylaxed?**

- Household contacts



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# Scenario 10- continued

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**Four year old brother of the 2-month old has been coughing for 14 days. His symptoms include cough and apnea. He has not been tested for pertussis but provider started brother on Z-pack.**

**What is the case status of the brother?**

- Not a case



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# Scenario 10- continued

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**While conducting the case investigation you discover the baby sitter of the 2-month old has been coughing for 15 days with paroxysms and whoop. Baby sitter has not been tested for pertussis.**

**What is the baby sitter's case status?**

- Probable

**Does this change the case status of the 2-month old?**

- No, baby is still probable due to the 10 day cough, but is now also epi-linked.

**Does the babysitter need to be prophylaxed as well?**

- Since the babysitter has symptoms, she should be given treatment. Start investigation on babysitter.



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# **SCENARIO 11**

# Scenario 11

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1. A 54-year-old inmate of local Correctional Facility A develops fever and cough on 8/2/18, followed by pneumonia on 8/3/18.
2. He is diagnosed with legionellosis after a positive urine antigen test and hospitalized from 8/3/18 to 8/8/18.
1. The inmate has been incarcerated in the correctional facility since 5/14/18, but has spent time away from the facility for court hearings.



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# Scenario 11

## (continued)

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1. You receive a report on 9/21/18 from a local hospital of a 35-year-old male inpatient who was diagnosed with *Legionella pneumonia*.
2. The patient's onset of cough, fever, headache, and SOB was 9/19/18, and he had a positive urine antigen test for *Legionella pneumophila* serogroup 1 on 9/20/18.
3. When you interview the patient, he tells you that he has worked as a correctional officer at Correctional Facility A for the last 5 years. His most recent shift was on 9/17/18.



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# **SCENARIO 12**

# Scenario 12

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**You receive a lab report via fax that says culture positive for *Streptococcus pneumoniae*. The specimen source is listed as bronchial lavage.**

**What is the case status?**

- Not a case. For public health purposes bronchial lavage, wash, and aspirate are not considered sterile sites.



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# **SCENARIO 13**



# Scenario 13

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1. A 20-year-old female develops fever and headache on 6/3/13, and wakes up on 6/4/13 with a purpuric rash on her legs and torso.

1. A local hospital IP reports that the patient was transported by ambulance to the ED in the evening on 6/4/13 and that gram-negative diplococci were cultured from her blood specimen.



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# Scenario 13

## (continued)

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1. You find out that the young woman attends summer school part-time at a local college and works in a daycare center part-time. She typically works at the daycare on Mondays and Wednesdays for 8 hours each day.
2. She last attended classes on Friday, May 31.
3. She last worked at the daycare center on Monday, 6/3/13 and went home sick after working for 4 hours. She is a “floater” who helps out in the infant room (ages 6 weeks – 12 months) and one of the toddler rooms (ages 14 months – 2 years) as needed throughout the day.



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# **SCENARIO 14**

# Scenario 14

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**You receive a blood culture lab report that is positive for *Haemophilus influenzae*. The patient is a 4-year old.**

**What does the Texas Administrative Code require to happen?**

- Send an isolate for serotyping to the DSHS Austin laboratory.

**The isolate is serotyped and is found to be non-typeable. Is this the same as being not tested or unknown?**

- No non-typeable is the unencapsulated strain of *H.flu* and is currently the most common in the U.S.



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# **SCENARIO 15**

# SCENARIO 15

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1. Below are two scenarios:
  1. Employee health for the local hospital calls and reports that a labor and delivery nurse just tested positive for pertussis by PCR.
  2. Outbreak of viral gastroenteritis affecting 70 out of 125 attendees of a wedding reception.
2. Due to limited time and resources, you can only investigate one of the outbreaks. What factors might you consider in deciding which outbreak to investigate?



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THANK

YOU

Questions, Comments, Last Thoughts?