

# Crash Course in Public Health: Surveillance, Reporting & Follow-up

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*Health and Wellness for all Arizonans*

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# Today's session

- Laura Erhart, ADHS:
  - What is Public Health Surveillance?
  - Communicable Disease Reporting: Who, What, When, How?
  - What does Public Health do with the Report? Case Investigations, Outbreaks, and Disease Stats
- Short Break
- Carla Chee, ADHS:
  - Tuberculosis
- Anissa Taylor, Pima County Health Department:
  - Local Health Perspectives
- Elizabeth Lueck, Cochise County Health Department:
  - Local Health Perspectives
- Laura Erhart, ADHS:
  - MEDSIS, Health Services Portal, and Resources

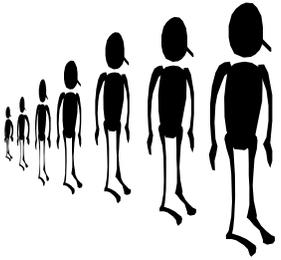
# WHAT IS PUBLIC HEALTH SURVEILLANCE?



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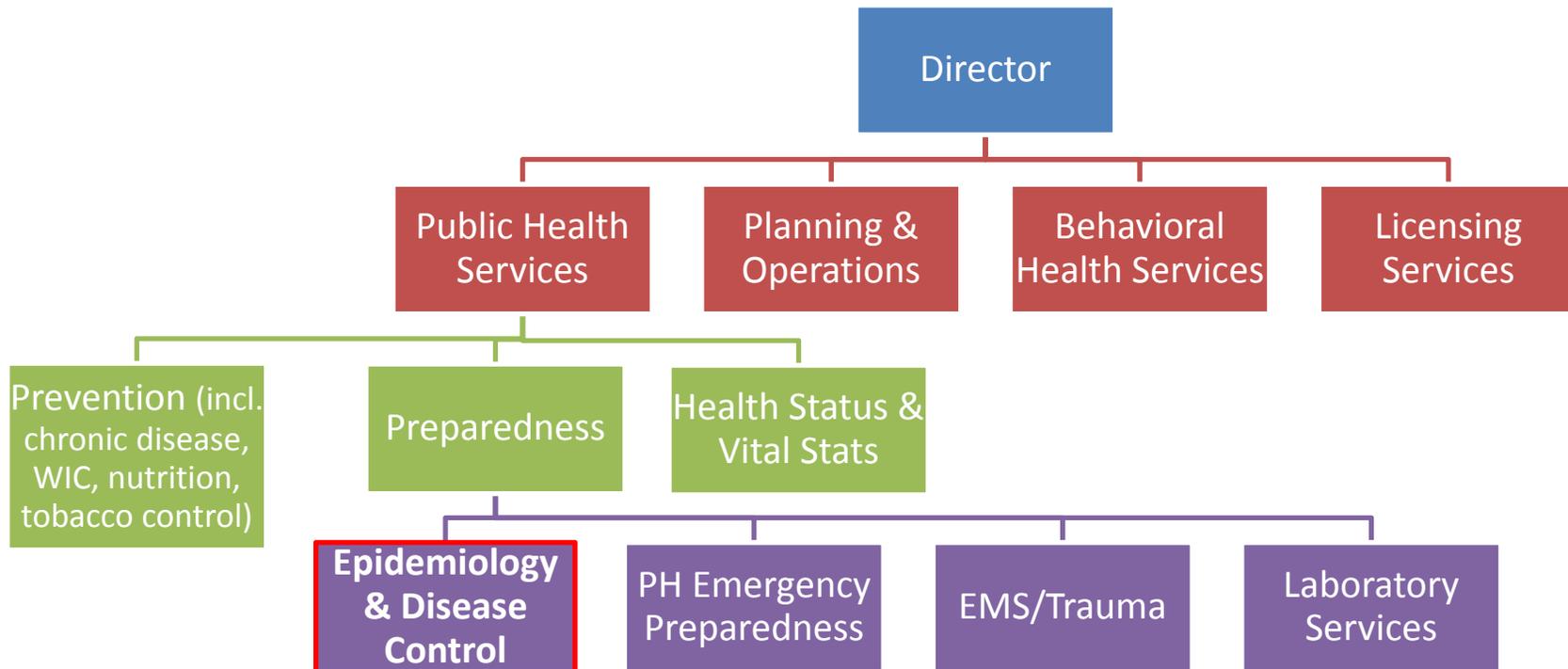
# What is Public Health?

- Public health is "the science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals" – Charles-Edward Amory Winslow, 1920
- *Focus on populations rather than individuals*
- Activities: educational programs, policies, research, services

# Public Health Agencies in AZ

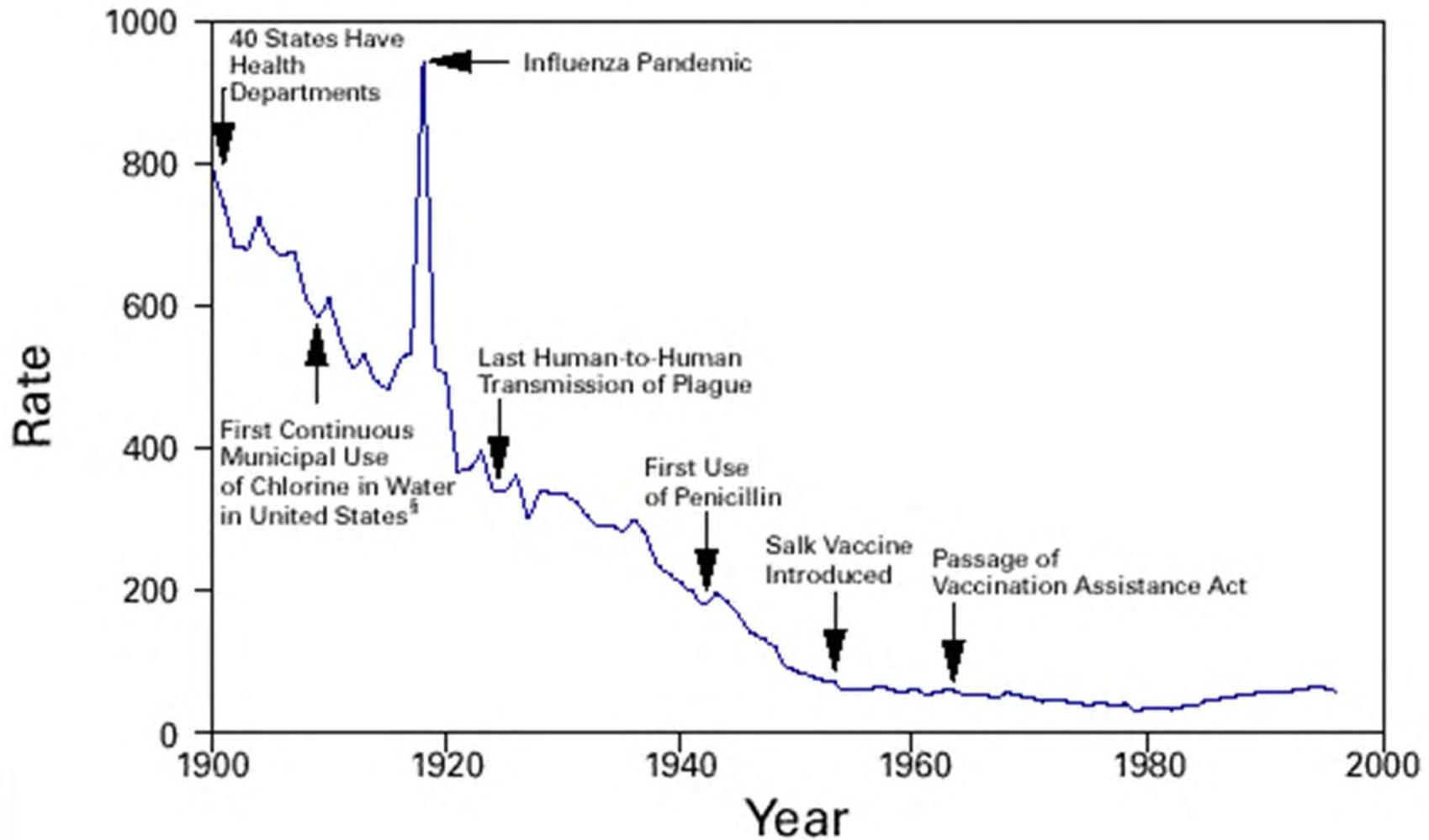
- Governmental agencies with explicit authorities:
  - State health department (ADHS)
  - County health departments in each county
  - Tribal and Indian Health Services
    - Lots of variation across tribal entities
- Lots of other agencies in AZ “do” PH – though authorities, responsibilities, and activities differ
  - Healthcare facilities, community groups, universities, non-profits...and many, many more

# ADHS (Simplified) Structure



# Infectious Disease Control

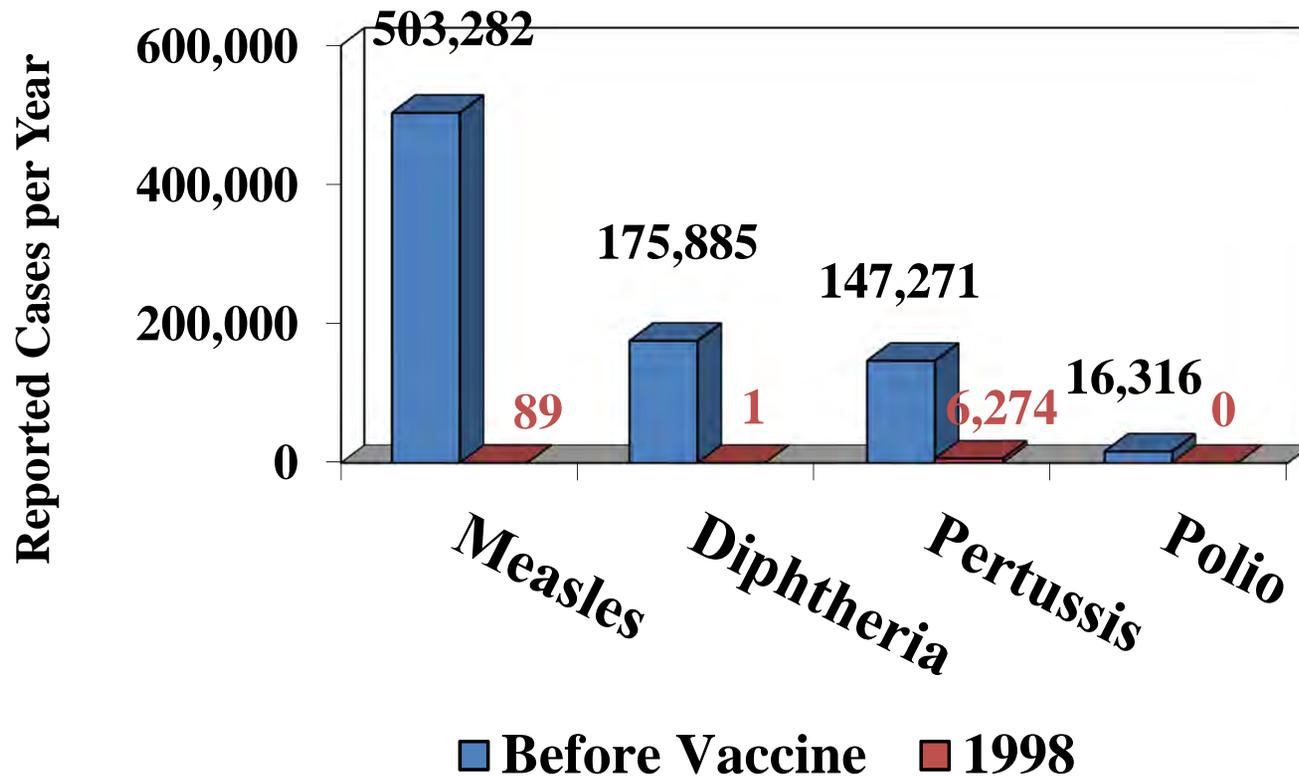
Crude death rate\* for infectious diseases — United States, 1900 –1996<sup>†</sup>



\*Per 100,000 population per year.

# Vaccinations

## Impact on Health by Immunizations, United States



# What is Public Health Surveillance?

*Systematic, ongoing* collection, collation, and analysis of data, and the timely dissemination of information to those who need to know, so that action can be taken.\*

## Surveillance

Collection (Reports)  
Analysis  
Interpretation  
Dissemination

## Public Health Action

Planning, implementing,  
and evaluating disease

- Investigation
- Control
- Prevention

# Surveillance Uses

- Recognize outbreaks and possible outbreaks
  - Estimate size, severity, location of outbreak
- Establish trends and baselines
- Target interventions
- Recognize emerging infections
- Describe the epidemiology of the disease in the population
- Evaluate programs, interventions & control measures
- Generate hypotheses, stimulate research
- Facilitate planning and resource allocation

# COMMUNICABLE DISEASE REPORTING: WHO, WHAT, WHEN, HOW?

# PH Surveillance across the U.S.

- National Notifiable Diseases Surveillance System: Council of State and Territorial Epidemiologists (CSTE) and CDC make recommendations about what diseases should be reportable across the U.S.
  - Approximately 65 conditions
  - Standardized definitions for each
  - Updated yearly
- **Reporting requirements are established at State level:**
  - Confer legal authority for reporting and data collection
  - Specify mechanism, time frame, and agency to receive reports
  - Specify which diseases or conditions to report (may include more or fewer than CSTE/CDC recommendations)



# Arizona State Statutes & Rules

## Arizona Revised Statute (Title 36, Chapter 6)

- Establishes broad public health authority for reporting, investigation, control, etc.

<http://www.azleg.state.az.us/ArizonaRevisedStatutes.asp?Title=36>

## Arizona Administrative Code (Title 9, Chapter 6)

- Provides greater definition & specifics

[http://www.azsos.gov/public\\_services/Title\\_09/9-06.htm](http://www.azsos.gov/public_services/Title_09/9-06.htm)

# Communicable Disease Rules (Arizona Administrative Code)

- Definitions of terms used
- Who must report (healthcare providers, labs, schools, childcares, shelter, pharmacies)
- What is reportable
  - Diseases, conditions, or laboratory results
  - Specific reportable information about the patient and condition
- Timeframes for reporting
- Case/contact control measures and investigations
- Local health agency responsibilities

# Reportable Diseases (Providers)

- Report to LOCAL HEALTH DEPT
- 88 morbidities/conditions
- Timeframe for reporting varies (within 24h of suspicion; 1 working day; 5 working days)
- Job type may matter (food handler, childcare, healthcare)
- Some reports are only needed if an outbreak is detected
- <http://www.azdhs.gov/phs/oids/pdf/rptlist.pdf>

-  \*O Amebiasis
-  Anthrax
-  Aseptic meningitis: viral
-  Basidiobolomycosis
-  Botulism
-  Brucellosis
-  \*O Campylobacteriosis
-  Chagas disease (American trypanosomiasis)
-  Chancroid
-  Chlamydia infection, sexually transmitted
-  \* Cholera
-  Coccidioidomycosis (valley fever)
-  Colorado tick fever
-  O Conjunctivitis: acute

Arizona Administrative Code<sup>†</sup> Requires Providers To:  
**Report Communicable Diseases**  
 to the Local Health Department

<input type="checkbox"/> *O Amebiasis	<input type="checkbox"/> Hantavirus infection	<input type="checkbox"/> *O Salmonellosis
<input type="checkbox"/> Anthrax	<input type="checkbox"/> Hemolytic uremic syndrome	<input type="checkbox"/> Scabies
<input type="checkbox"/> Aseptic meningitis: viral	<input type="checkbox"/> *O Hepatitis A	<input type="checkbox"/> Severe acute respiratory syndrome
<input type="checkbox"/> Basidiobolomycosis	<input type="checkbox"/> Hepatitis B and D	<input type="checkbox"/> *O Shigellosis
<input type="checkbox"/> Botulism	<input type="checkbox"/> Hepatitis C	<input type="checkbox"/> Smallpox
<input type="checkbox"/> Brucellosis	<input type="checkbox"/> *O Hepatitis E	<input type="checkbox"/> Streptococcal Group A: invasive disease
<input type="checkbox"/> *O Campylobacteriosis	<input type="checkbox"/> Herpes genitalis	<input type="checkbox"/> Streptococcal Group B: invasive disease in infants younger than 90 days of age
<input type="checkbox"/> Chagas disease (American trypanosomiasis)	<input type="checkbox"/> HIV infection and related disease	<input type="checkbox"/> <i>Streptococcus pneumoniae</i> (pneumococcal invasive disease)
<input type="checkbox"/> Chancroid	<input type="checkbox"/> Influenza-associated mortality in a child	<input type="checkbox"/> Syphilis
<input type="checkbox"/> Chlamydia infection, sexually transmitted	<input type="checkbox"/> Kawasaki syndrome	<input type="checkbox"/> *O Taeniasis
<input type="checkbox"/> * Cholera	<input type="checkbox"/> Legionellosis (Legionnaires' disease)	<input type="checkbox"/> Tetanus
<input type="checkbox"/> Coccidioidomycosis (valley fever)	<input type="checkbox"/> Leptospirosis	<input type="checkbox"/> Toxic shock syndrome
<input type="checkbox"/> Colorado tick fever	<input type="checkbox"/> Listeriosis	<input type="checkbox"/> Trichinosis
<input type="checkbox"/> Conjunctivitis: acute	<input type="checkbox"/> Lyme disease	<input type="checkbox"/> Tuberculosis, active disease
<input type="checkbox"/> Creutzfeldt-Jakob disease	<input type="checkbox"/> Lymphocytic choriomeningitis	<input type="checkbox"/> Tuberculosis latent infection in a child 5 years of age or younger (positive screening test result)
<input type="checkbox"/> *O Cryptosporidiosis	<input type="checkbox"/> Malaria	<input type="checkbox"/> Tularemia
<input type="checkbox"/> <i>Cyclospora</i> infection	<input type="checkbox"/> Measles (rubeola)	<input type="checkbox"/> Typhoid fever
<input type="checkbox"/> Cysticercosis	<input type="checkbox"/> Meningococcal invasive disease	<input type="checkbox"/> Typhus fever
<input type="checkbox"/> Dengue	<input type="checkbox"/> Mumps	<input type="checkbox"/> Unexplained death with a history of fever
<input type="checkbox"/> Diarrhea, nausea, or vomiting	<input type="checkbox"/> Pertussis (whooping cough)	<input type="checkbox"/> Vaccinia-related adverse event
<input type="checkbox"/> Diphtheria	<input type="checkbox"/> Plague	<input type="checkbox"/> Vancomycin-resistant or Vancomycin-intermediate <i>Staphylococcus aureus</i>
<input type="checkbox"/> Ehrlichiosis and Anaplasmosis	<input type="checkbox"/> Poliomyelitis	<input type="checkbox"/> Vancomycin-resistant <i>Staphylococcus epidermidis</i>
<input type="checkbox"/> Emerging or exotic disease	<input type="checkbox"/> Psittacosis (ornithosis)	<input type="checkbox"/> Varicella (chickenpox)
<input type="checkbox"/> Encephalitis, viral or parasitic	<input type="checkbox"/> Q fever	<input type="checkbox"/> *O <i>Vibrio</i> infection
<input type="checkbox"/> Enterohemorrhagic <i>Escherichia coli</i>	<input type="checkbox"/> Rabies in a human	<input type="checkbox"/> Viral hemorrhagic fever
<input type="checkbox"/> Enterotoxigenic <i>Escherichia coli</i>	<input type="checkbox"/> Relapsing fever (borreliosis)	<input type="checkbox"/> West Nile virus infection
<input type="checkbox"/> *O Giardiasis	<input type="checkbox"/> Reye syndrome	<input type="checkbox"/> Yellow fever
<input type="checkbox"/> Gonorrhea	<input type="checkbox"/> Rocky Mountain spotted fever	<input type="checkbox"/> *O Yersiniosis
<input type="checkbox"/> <i>Haemophilus influenzae</i> : invasive disease	<input type="checkbox"/> * Rubella (German measles)	
<input type="checkbox"/> Hansen's disease (Leprosy)	<input type="checkbox"/> Rubella syndrome, congenital	

- Submit a report by telephone or through an electronic reporting system authorized by the Department within 24 hours after a case or suspect case is diagnosed, treated, or detected or an occurrence is detected.
- \* If a case or suspect case is a food handler or works in a child care establishment or a health care institution, instead of reporting within the general reporting deadline, submit a report within 24 hours after the case or suspect case is diagnosed, treated, or detected.
- Submit a report within one working day after a case or suspect case is diagnosed, treated, or detected.
- Submit a report within five working days after a case or suspect case is diagnosed, treated, or detected.
- Submit a report within 24 hours after detecting an outbreak.

# Communicable Disease Report (CDR)



## COMMUNICABLE DISEASE REPORT

Important Instructions: Please complete sections 1-3 for all reportable conditions. In addition, complete Section 4 for STDs and HIV/AIDS cases, Section 5 for hepatitis, and Section 6 for tuberculosis. Once completed, return to your county or tribal health agency. If reporting through MEDSIS, go to [siren.az.gov](http://siren.az.gov).

County / IHS Number	State ID / MEDSIS ID	Date Received by County
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### 1. PATIENT INFORMATION

Patient's Name (Last, First, Middle)		Date of Birth	Race (check all that apply): <input type="checkbox"/> White <input type="checkbox"/> Pacific Islander <input type="checkbox"/> Unknown <input type="checkbox"/> Black <input type="checkbox"/> Native American <input type="checkbox"/> Asian <input type="checkbox"/> Other		Ethnicity: <input type="checkbox"/> Hispanic <input type="checkbox"/> Non-Hispanic <input type="checkbox"/> Unknown		Gender: <input type="checkbox"/> Male <input type="checkbox"/> Unknown <input type="checkbox"/> Female <input type="checkbox"/> Transgender		Pregnant: <input type="checkbox"/> No <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Yes Due date _____	
Street Address:			County:	Reservation:	Telephone#:					
Patient's Occupation or School:		Guardian: (not necessary for STD)		Outcome: <input type="checkbox"/> Survived <input type="checkbox"/> Died Date: _____		Is the patient any of the following? <input type="checkbox"/> Healthcare worker <input type="checkbox"/> Food worker/handler <input type="checkbox"/> School or childcare worker or attendee Facility Name & Address: _____				

Patient Info

### 2. REPORTABLE CONDITION INFORMATION / LAB RESULTS

Diagnosis or Suspect Reportable Condition		Onset Date	Diagnosis Date		
LAB	Date Collected	Date Finalized	Specimen Type <input type="checkbox"/> Blood <input type="checkbox"/> CSF <input type="checkbox"/> Urine <input type="checkbox"/> Stool <input type="checkbox"/> NP Swab <input type="checkbox"/> Sputum <input type="checkbox"/> Other _____	Lab Test	Lab Result
	Date Collected	Date Finalized	Specimen Type <input type="checkbox"/> Blood <input type="checkbox"/> CSF <input type="checkbox"/> Urine <input type="checkbox"/> Stool <input type="checkbox"/> NP Swab <input type="checkbox"/> Sputum <input type="checkbox"/> Other _____	Lab Test	Lab Result
	Date Collected	Date Finalized	Specimen Type <input type="checkbox"/> Blood <input type="checkbox"/> CSF <input type="checkbox"/> Urine <input type="checkbox"/> Stool <input type="checkbox"/> NP Swab <input type="checkbox"/> Sputum <input type="checkbox"/> Other _____	Lab Test	Lab Result

### 3. REPORTER & PROVIDER INFORMATION

Reporting Source (Physician or other reporting source)		Facility			
Street Address		City	State	Zip code	Telephone#
Provider (if different from Reporter)		Facility			
Provider Street Address		City	State	Zip code	Telephone#
Laboratory Name, Address and Telephone#					

Diagnosis & Lab

Facility Info

Standardized form used to collect basic information on all reportable morbidities  
 Additional sections for STDs, hepatitis, or TB

[http://www.azdhs.gov/phs/oids/pdf/forms/cdr\\_form.pdf](http://www.azdhs.gov/phs/oids/pdf/forms/cdr_form.pdf)



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# Reportable Diseases (School, Child Care Establishment, Shelter)

Arizona Administrative Code\* Requires an Administrator of a School, Child Care Establishment, or Shelter To:

## REPORT COMMUNICABLE DISEASES to the Local Health Department

-  Campylobacteriosis
-  Conjunctivitis: acute
-  Cryptosporidiosis
-  Diarrhea, nausea, or vomiting
-  Enterohemorrhagic *Escherichia coli*
-  *Haemophilus influenzae*: invasive disease
-  Hepatitis A
-  Measles
-  Meningococcal invasive disease
-  Mumps
-  Pertussis (whooping cough)
-  Rubella (German measles)
-  Salmonellosis
-  Scabies
-  Shigellosis
-  Streptococcal Group A infection
-  Varicella (chicken pox)

- Report to LOCAL HEALTH DEPARTMENT
- 17 morbidities/conditions
- Most commonly reported:
  - Outbreaks of diarrhea, nausea or vomiting
  - Chickenpox
- [http://www.azdhs.gov/phs/oids/pdf/rptlist\\_schools.pdf](http://www.azdhs.gov/phs/oids/pdf/rptlist_schools.pdf)

# Reportable Results (Labs)

- Report to STATE HEALTH DEPT
- 58 organisms/conditions
- Most align with provider-reportable list
  - Some morbidities don't have clear lab test
  - Some are lab-reportable only (flu, invasive MRSA, RSV)
- Timeframe for reporting varies (immediately after test request; within 24h of positive test; 1 working day; 5 days)
- <http://www.azdhs.gov/phs/oids/pdf/labrptlist.pdf>

- ① Arboviruses
- 🔔📞\* *Bacillus anthracis*
- 📞\* *Bordetella pertussis*
- ①\* *Brucella spp.*
  
- ①\* *Burkholderia mallei* and *B. pseudomallei*
- 📧 *Campylobacter spp.*

*Provider reports and Lab reports are shared between ADHS & local HD. Reports on the same person are linked together.*

**Reports should be sent to:**  
 Arizona Department of Health Services  
 Infectious Disease Epidemiology  
 150 North 18<sup>th</sup> Avenue, Suite 140  
 Phoenix, AZ 85007  
 602-364-3676 or 602-364-3199 (fax)

# ARIZONA LABORATORY REPORTING REQUIREMENTS

**Isolates should be sent to:**  
 Arizona State Laboratory  
 250 North 17<sup>th</sup> Avenue  
 Phoenix, AZ 85007

① Arboviruses	☒* <i>Haemophilus influenzae</i> , other, isolated from a normally sterile site	☒ <i>Plasmodium</i> spp.
☒* <i>Bacillus anthracis</i>	☒ Hantavirus	☒ Respiratory syncytial virus
☒* <i>Bordetella pertussis</i>	☒ <sup>1</sup> Hepatitis A virus (anti-HAV-IgM serologies)	☒+ Rubella virus and anti-rubella-IgM serologies
☒* <i>Brucella</i> spp.	☒ <sup>1</sup> Hepatitis B virus (anti-Hepatitis B core-IgM serologies, Hepatitis B surface or envelope antigen serologies, or detection of viral nucleic acid)	☒* <i>Salmonella</i> spp.
☒* <i>Burkholderia mallei</i> and <i>B. pseudomallei</i>	☒ <sup>1</sup> Hepatitis C virus	☒ SARS-associated corona virus
☒ <i>Campylobacter</i> spp.	☒ <sup>1</sup> Hepatitis D virus	☒* <i>Shigella</i> spp.
☒ CD4-T-lymphocyte count of fewer than 200 per microliter of whole blood or CD4-T-lymphocyte percentage of total lymphocytes of less than 14%	☒ <sup>1</sup> + Hepatitis E virus (anti-HEV-IgM serologies)	☒ <i>Streptococcus</i> Group A, isolated from a normally sterile site
☒ <i>Chlamydia trachomatis</i>	☒ HIV (by culture, antigen, antibodies to the virus, or detection of viral nucleic acid)	☒ <i>Streptococcus</i> Group B, isolated from a normally sterile site in an infant younger than 90 days of age
☒ <i>Clostridium botulinum</i> toxin (botulism)	☒ HIV—any test result for an infant (by culture, antigen, antibodies to the virus, or detection of viral nucleic acid)	☒* <i>Streptococcus pneumoniae</i> and its drug sensitivity pattern, isolated from a normally sterile site
☒ <i>Coccidioides</i> spp., by culture or serologies	☒ Influenza virus	☒ <i>Treponema pallidum</i> (syphilis)
① <i>Coxiella burnetii</i>	☒* <i>Legionella</i> spp. (culture or DFA)	☒ <i>Trypanosoma cruzi</i> (Chagas disease)
☒ <i>Cryptosporidium</i> spp.	☒* <i>Listeria</i> spp., isolated from a normally sterile site	☒* Vancomycin-resistant or Vancomycin-intermediate <i>Staphylococcus aureus</i>
① <i>Cyclospora</i> spp.	☒+ Measles virus and anti-measles-IgM serologies	☒* Vancomycin resistant <i>Staphylococcus epidermidis</i>
☒ Dengue virus	☒ <sup>2</sup> Methicillin-resistant <i>Staphylococcus aureus</i> , isolated from a normally sterile site	☒ Variola virus (smallpox)
☒ Emerging or exotic disease agent	☒+ Mumps virus and anti-mumps-IgM serologies	☒* <i>Vibrio</i> spp.
☒ <i>Entamoeba histolytica</i>	☒* <sup>3</sup> <i>Mycobacterium tuberculosis</i> complex and its drug sensitivity pattern	☒ Viral hemorrhagic fever agent
① <i>Escherichia coli</i> O157:H7	☒ <i>Neisseria gonorrhoeae</i>	☒ West Nile virus
☒* <i>Escherichia coli</i> , Shiga-toxin producing	☒* <i>Neisseria meningitidis</i> , isolated from a normally sterile site	☒* <i>Yersinia</i> spp. (other than <i>Y. pestis</i> )
☒* <i>Francisella tularensis</i>	☒ Norovirus	☒* <i>Yersinia pestis</i> (plague)
☒* <i>Haemophilus influenzae</i> , type b, isolated from a normally sterile site		

☒ Submit a report immediately after receiving one specimen for detection of the agent. Report receipt of subsequent specimens within five working days after receipt.

☒ Submit a report within 24 hours after obtaining a positive test result.

① Submit a report within one working day after obtaining a positive test result.

☒ Submit a report within five working days after obtaining a positive test result or a test result specified on this page.

\* Submit an isolate of the organism for each positive culture to the Arizona State Laboratory at least once each week, as applicable.

+ For each positive test result, submit a specimen to the Arizona State Laboratory within 24 hours after obtaining the positive test result.

<sup>1</sup> When reporting a positive result for any of the specified tests, report the results of all other tests performed for the subject as part of the disease panel.

<sup>2</sup> Submit a report only when an initial positive result is obtained for an individual.

<sup>3</sup> Submit an isolate of the organism only when an initial positive result is obtained for an individual, when a change in resistance pattern is detected, or when a positive result is obtained  $\geq$  12 months after the initial positive result is obtained for an individual.

# Lab Reporting Form

Laboratory	
Laboratory Director	
Address	
City, State, Zip Code	
Phone Number	

**Arizona Department of Health Services  
Communicable Disease\*  
Weekly Laboratory Report**

*\* Use other forms for HIV and TB Laboratory reports*

Patient name	Birth date	Gender M <input type="checkbox"/> F <input type="checkbox"/> U <input type="checkbox"/>	Phone	Address	City & Zip code
Lab Reference Number	Collection date	Specimen Type	Test type	Result	Result date
Facility Name	Physician Name	Phone	Address	City & Zip code	
Patient name	Birth date	Gender M <input type="checkbox"/> F <input type="checkbox"/> U <input type="checkbox"/>	Phone	Address	City & Zip code
Lab Reference Number	Collection date	Specimen Type	Test type	Result	Result date
Facility Name	Physician Name	Phone	Address	City & Zip code	
Patient name	Birth date	Gender M <input type="checkbox"/> F <input type="checkbox"/> U <input type="checkbox"/>	Phone	Address	City & Zip code
Lab Reference Number	Collection date	Specimen Type	Test type	Result	Result date
Facility Name	Physician Name	Phone	Address	City & Zip code	

Much shorter than CDR (provider form)

Can report several tests per page

**Labs are welcome to send print-off of lab results instead, if contains required info!**

<http://www.azdhs.gov/phs/oids/pdf/forms/labform.pdf>



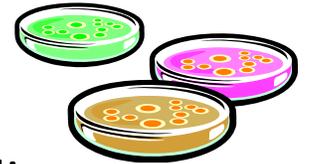
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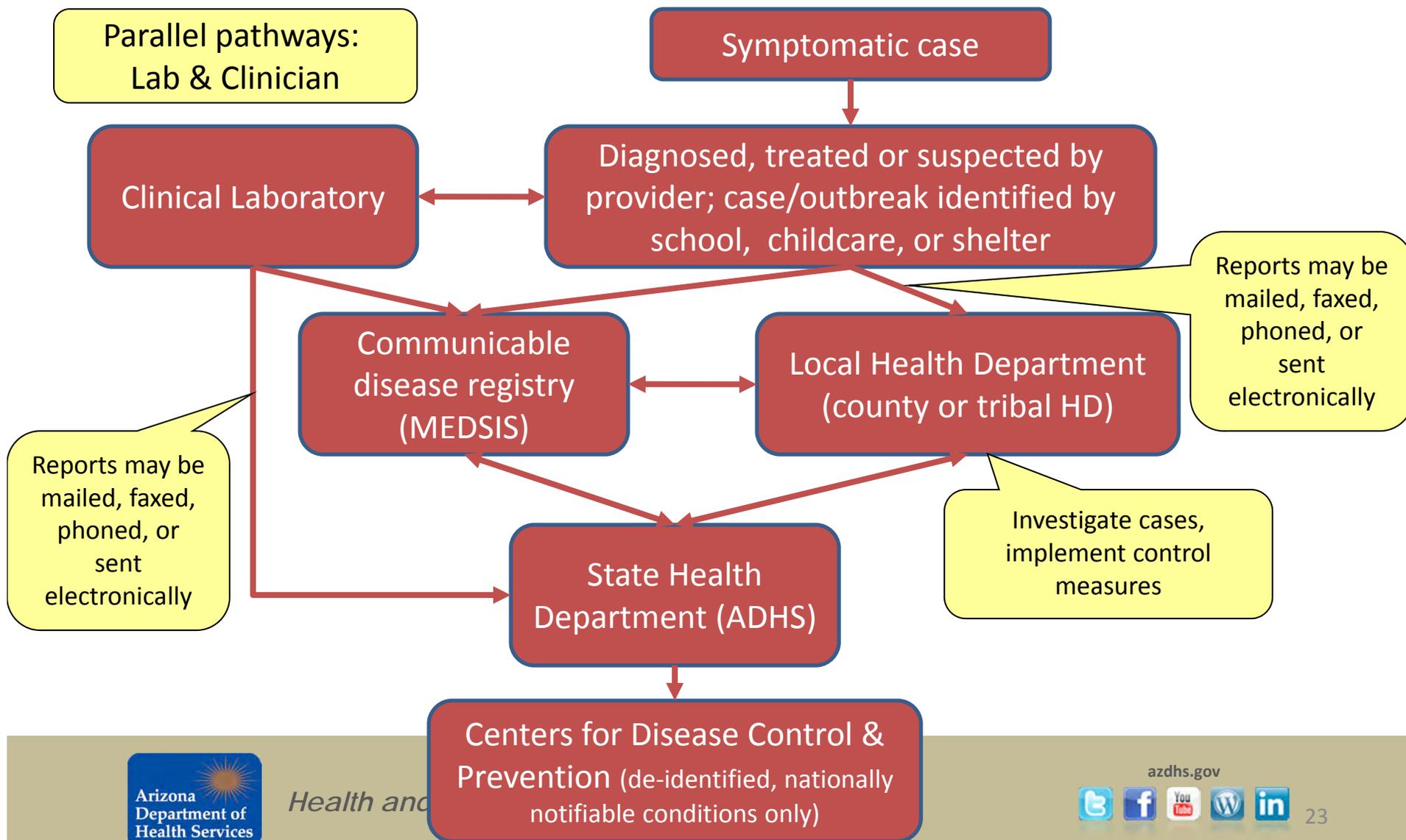


# Laboratory Isolates/Specimens

- Isolates or specimens for 23 organisms must be submitted to the Arizona State Public Health Laboratory (ASPHL) after positive test
  - Confirmatory testing, and/or
  - Specialized testing to identify subtype, serogroup, etc.
    - Tests may not be available at clinical laboratory or may not be relevant for patient care but are important for PH
  - Some specimens or isolates are also sent to CDC
- Specimens should be submitted according to ASPHL guidelines
  - Microbiology submission form & Guide to Lab Services:  
<http://www.azdhs.gov/lab/micro/index.htm>
- Part of lab requirements, but we may ask the local HD or healthcare facility to help during a high priority investigation



# Flow Chart for Disease Reporting



After a provider, lab or school reports a case to public health...

# WHAT HAPPENS NEXT?



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# A case has been reported...now what?



# Evaluate the Report: Case Definitions

- Criteria used to determine whether an individual is **counted** as having a specific disease
- Intended to be simple, practical, objective
- For epidemiological/PH purposes, not clinical
  - Appropriate treatment should be provided as medically indicated, regardless of whether a patient meets the case definition!
- Control measures should be initiated as appropriate, regardless of case classification status
- CSTE/CDC establish national case definitions; ADHS adopts these definitions – with some modifications

<http://www.azdhs.gov/phs/oids/pdf/casedefinitions.pdf>

# Components of a Case Definition

## Salmonellosis (relatively simple definition):

### Clinical Description

- An illness of variable severity commonly manifested by diarrhea, abdominal pain, nausea, and sometimes vomiting. Asymptomatic infections may occur and the organism may cause extraintestinal infections.

### Laboratory Criteria for Diagnosis

- Confirmed: Isolation of *Salmonella* from a clinical specimen

### Case Classification

- Confirmed: A case that is laboratory confirmed.
- Probable: A clinically compatible illness that is epidemiologically linked to a confirmed case.

# Case Definitions



## Pertussis (whooping cough) (a little more complex):

### Clinical Description

- A cough illness lasting at least 2 weeks with one of the following: paroxysms of coughing, inspiratory "whoop," or post-tussive vomiting, without other apparent cause (as reported by a health professional)

### Laboratory Criteria for Diagnosis

- Isolation of *Bordetella pertussis* from clinical specimen
- Positive polymerase chain reaction (PCR) for *B. pertussis*

### Case Classification

- Confirmed: A case that is **culture-positive** and in which an acute cough illness of any duration is present; or a case that meets the **clinical case definition and is confirmed by positive PCR**; or a case that meets the **clinical case definition and is epidemiologically linked** directly to a case confirmed by either culture or PCR
- Probable: A case that meets the **clinical case definition, is not laboratory confirmed, and is not epidemiologically linked** to a laboratory-confirmed case

# Case Investigations



- Process of finding out more information about each reported case in order to assess the need for public health control measures or additional follow-up, and monitor changes in the epidemiology of the disease
  - Information collected includes risk factors, exposures, contacts, vaccination, travel history, etc. (depending on the disease)
  - May be part of an outbreak investigation or routine surveillance
  - Required for selected diseases, by rule
- Sources of information include:
  - Medical records, healthcare providers, patient/parents, immunization registry
- Usually conducted by local health department
  - ADHS may assist if requested
  - ADHS often leads or coordinates multi-jurisdiction outbreaks

# Case Investigations

- Standardized, disease-specific forms (“long forms” – compared to CDR)
  - Some developed by CDC, some by ADHS
  - Can help direct questions that need to be asked during an investigation -- But do NOT necessarily constitute “everything that needs to be done”
  - <http://www.azdhs.gov/phs/oids/investigations/forms.htm>
- Types of questions include:
  - Symptoms
  - Gastrointestinal illnesses: food history
  - Vaccine-preventable diseases: vaccination history
  - Vectorborne/zoonotic diseases: environmental/animal exposures
  - Diseases not commonly found in AZ: travel history
  - Disease spread person-to-person and relatively rare: recent ill contacts, or location case frequented while infectious
- Information likely more accurate if collected soon after case report

# Implementing Control Measures

- Goal: Prevent additional cases!
- Actions taken are based on the epidemiology of the disease and information collected during case investigations
- Many different measures (depending on disease):
  - Remove contaminated product (food, med, etc.) from sale & use
  - Exclude ill persons from work, school, etc.
  - Provide or recommend vaccination or chemoprophylaxis to exposed, susceptible contacts
  - Exclude unvaccinated children from school
  - Warn providers to be on the look-out for additional cases – to help identify additional cases quickly for treatment, lab testing, or infection control
  - Provide education to facility, public, etc., about how to prevent the disease (hand washing, risks of consuming particular foods, protocols for particular procedures, etc.)

# Control Measures

- May involve many different agencies:
  - US FDA/USDA; AZ Dept of Ag; State/Local Environmental Health; healthcare facilities; schools
- Some are mandated or provided for by rule, for example:
- *E. coli*:
  - **Exclude** an enterohemorrhagic *Escherichia coli* case or suspect case with diarrhea **from working as a food handler, caring for patients or residents in a health care institution, or caring for children in or attending a child care establishment until**:
    - a. **Two successive cultures negative** for enterohemorrhagic *Escherichia coli* are obtained from stool specimens collected from the case at least 24 hours apart and at least 48 hours after discontinuing antibiotics, or
    - b. Diarrhea has resolved.

# Control Measures: Measles

## Case control measures:

1. **An administrator of a school or child care establishment**, either personally or through a representative, shall:
  - a. **Exclude a measles case from the school or child care establishment** and from school- or child-care-establishment-sponsored events **from the onset of illness through the fourth calendar day after the rash appears**; and
  - b. Exclude a measles suspect case from the school or child care establishment and from school- or child-care-establishment-sponsored events until evaluated and determined to be noninfectious by a physician, physician assistant, or registered nurse practitioner.
2. A diagnosing **health care provider** or an administrator of a health care institution, either personally or through a representative, **shall isolate and institute airborne precautions** for a measles case from onset of illness through the fourth calendar day after the rash appears.

## Contact control measures:

1. **When a measles case has been at a school or child care** establishment, the administrator of the school or child care establishment, either personally or through a representative, shall:
  - a. **Consult with the local health agency to determine who shall be excluded and how long** each individual shall be excluded from the school or child care establishment
2. A local health agency shall provide or **arrange for immunization of each non-immune measles contact within 72 hours** after last exposure, if possible.
3. An administrator of a health care institution shall ensure that a paid or volunteer full-time or part-time **worker at a health care institution does not participate in the direct care of a measles case** or suspect case unless the worker is able to provide evidence of immunity to measles through one of the following:
  - a. A record of immunization against measles with two doses of live virus vaccine given on or after the first birthday and at least one month apart;
  - b. A statement signed by a physician, physician assistant, registered nurse practitioner, state health officer, or local health officer affirming serologic evidence of immunity to measles; or
  - c. Documentary evidence of birth before January 1, 1957.

# Prioritizing Investigations & Actions

- Many times, there are not enough staff to immediately investigate each reported case. So, we need to **prioritize**.
- Criteria to consider:
  - How communicable is the disease?
    - Does it spread easily person-to-person? Or exists commonly in environment?
  - Are there effective public health control measures?
    - Infection control, isolation, vaccination, etc.
    - Are we within the timeframe to enact those measures?
  - How severe is the disease?
    - Likelihood of death or long-term sequelae without intervention
  - Is there reason to think the case is part of an outbreak?
  - What are the public health consequences of NOT investigating this case NOW?

*Sometimes, the control measures and/or investigation need to be implemented even before there is enough info to classify the case according to the case definitions.*

# Data Analysis



- Goals (remember the “Surveillance Uses” slide):
  - Recognize outbreaks and possible outbreaks
  - Establish trends and baselines
  - Target interventions
  - Recognize emerging infections
  - Describe the epidemiology of the disease in the population
  - Evaluate programs, interventions & control measures
  - Generate hypotheses, stimulate research
  - Facilitate planning and resource allocation
- Summarize information about reported cases
- Identify when we are seeing “something unexpected”
- Disseminate reports and other aggregated information to PH partners and public

# How Do I Know When I See “Something Unexpected”?

- Lots and lots of ways to look at your data!
- Know what is Expected (baseline data) for your facility/county/state
  - Measles, AZ: 2011 = 2; 2006-2010 median = 0
  - Salmonellosis, AZ: 2011 = 878; 2006-2010 median = 992
  - Cocci/Valley Fever, AZ: 2011 = 16,472; 2006-2010 median = 5,535
- Are there patterns within your data?
  - Seasonality? Mostly children? Mostly male?
- If you have very few cases or a very clear baseline profile, just eyeball it – no need for fancy stats!

# Basic Epi Reports & Statistics

- Case counts: Regular, simple analysis
  - Pick up on obvious anomalies
  - Look at various time frames (e.g., each month, year-to-date)
  - Look at data by demographics (e.g., age, sex, location)
- Comparison to historic data: Provide some baseline data
  - Same time frame last year, 5-year median

## CONFIRMED & PROBABLE CASES 2012 YEAR-TO-DATE\* (selected morbidities)

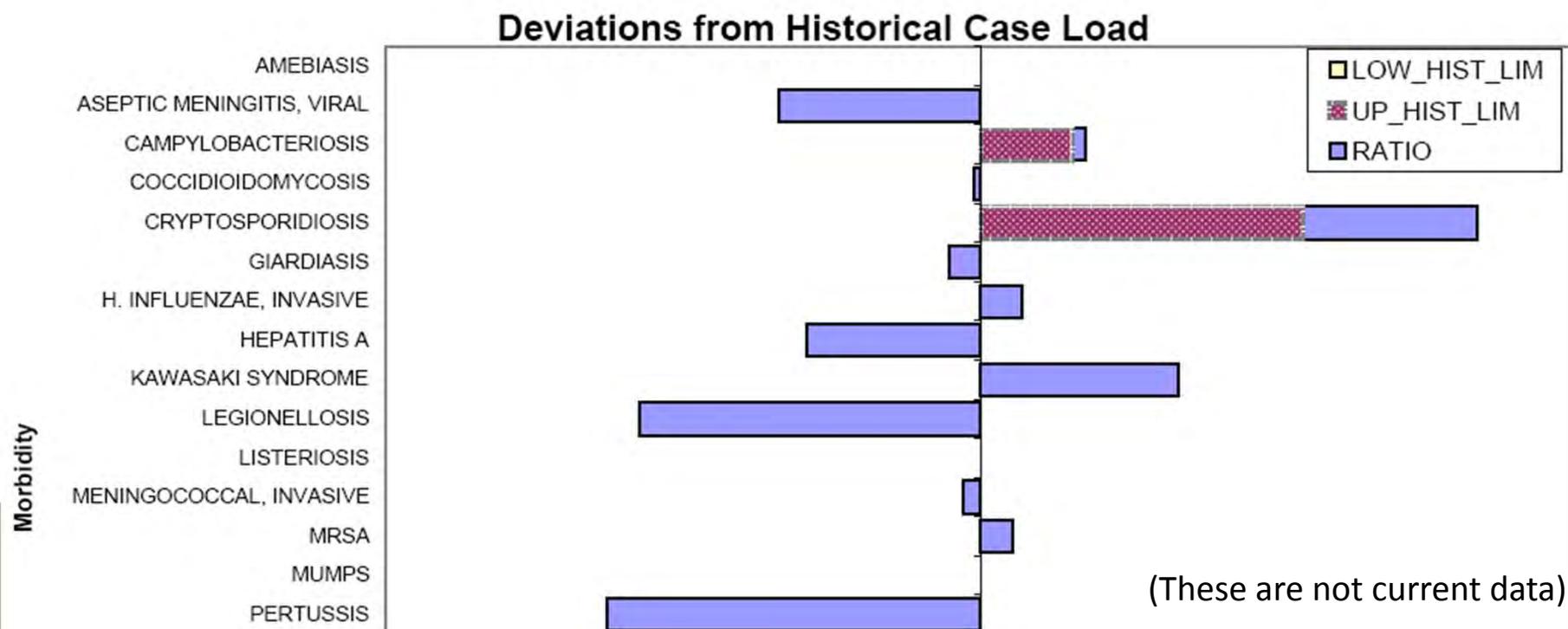
\* All 2012 data are provisional

\* Based on date reported to public health

MORBIDITY	APACHE	COCHISE	COCONINO	GILA	GRAHAM	GREENLEE	LA PAZ	MARICOPA	MOHAVE
AMEBIASIS	0	0	1	0	0	0	0	2	0
ASEPTIC MENINGITIS, VIRAL	0	0	7	0	0	0	0	191	4
BASIDIOMYCOSES									
BRUCELLOSIS									
CAMPYLOBACTERIOSIS									
CHAGAS DISEASE									
COCCIDIOIDOMYCOSES									
					Jan-Dec 2011	Jan-Dec 2010		5 Year Median Jan-Dec (2006-2010)	
	<b>VACCINE PREVENTABLE DISEASES:</b>								
	<i>Haemophilus influenzae</i> , serotype b invasive disease (<5 years of age)				1(1)	5(2)		4(3)	
	Measles				2	1		0	
	Meningococcal infection, invasive				16	14		14	
	Mumps				0	5		4	
	Pertussis (confirmed)				867 (160)	546 (95)		277 (36)	

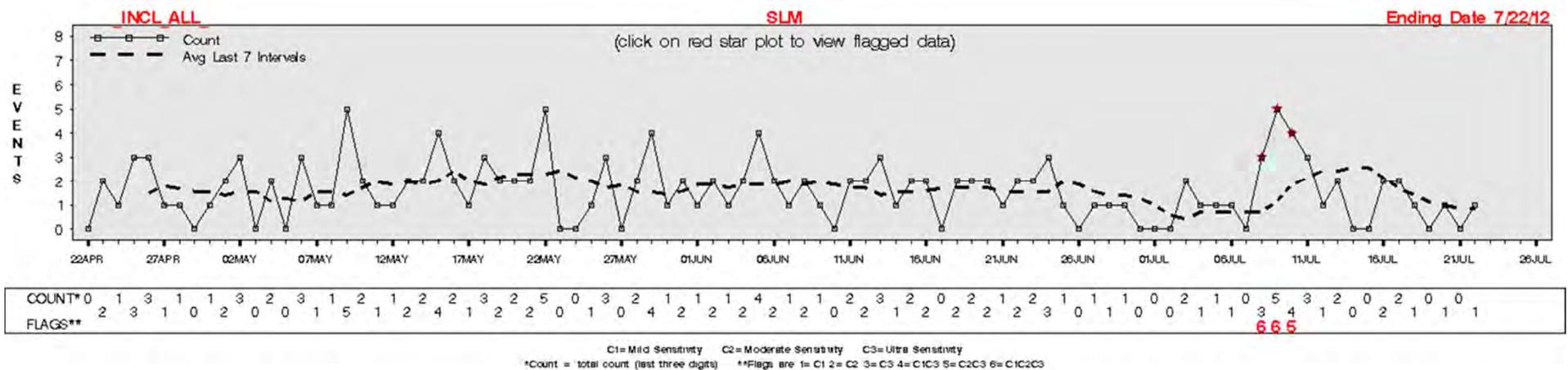
# More Advanced Methods

- Statistical tests & methods may help detect differences from “normal”
  - Probably not useful if you don’t have many cases
- “MMWR method”: compare current 4 weeks to mean case counts in particular time periods in past 5 years – flag diseases where current case count exceeds 2 times standard deviation



# More Advanced Methods

- Early aberration reporting system (EARS): uses the previous 7 days as the baseline



- Many more technical methods exist
  - SatScan (spatiotemporal clusters)
  - CUSUM (cumulative sum), moving averages
- Bottom line:
  - Need to find a method that will give sufficient sensitivity but not overwhelm investigation system with false alarms

# Various Reasons for Increases in Reported Cases



- Review your data
  - Data entry errors, analysis errors, confirmation of diagnosis (e.g., lab tests)
- Real changes in disease in the community:
  - Seasonality (e.g., influenza during winter months)
  - Emergence/spread of a disease
  - Outbreaks! – look for any similarities between cases:
    - Age
    - Location
    - Associations between people
    - Lab information about the organism
- Surveillance artifact (increases in the number of cases that are NOT due to an increase in disease):
  - Change in reporting requirements
  - Change in how people report
  - New provider in the community
  - New lab test

# Flu is on rampage

thro  
vao

## Officials probe E. coli outbreak in 6 states

Jun. 8, 2012 10:31 AM  
Associated

4 comments

By an  
As  
Recomm

# Swine flu outbreak 15 times deadlier than thought, study finds

ATLANTA  
illnesses

By MyHe

## Outbreak of rare illness reported in Arizona, Mexico

The number  
higher than

Jul. 25, 2011 11:00 AM  
Associated Pre

## Listeria outbreak deadliest since 1924, the CDC reports

29 have died of illness linked to cantaloupes

Recomm

by Elizabeth V  
USA Today

Recomm

# CDC: Whooping cough epidemic worst in 50 years

SAN LUIS -  
has been re

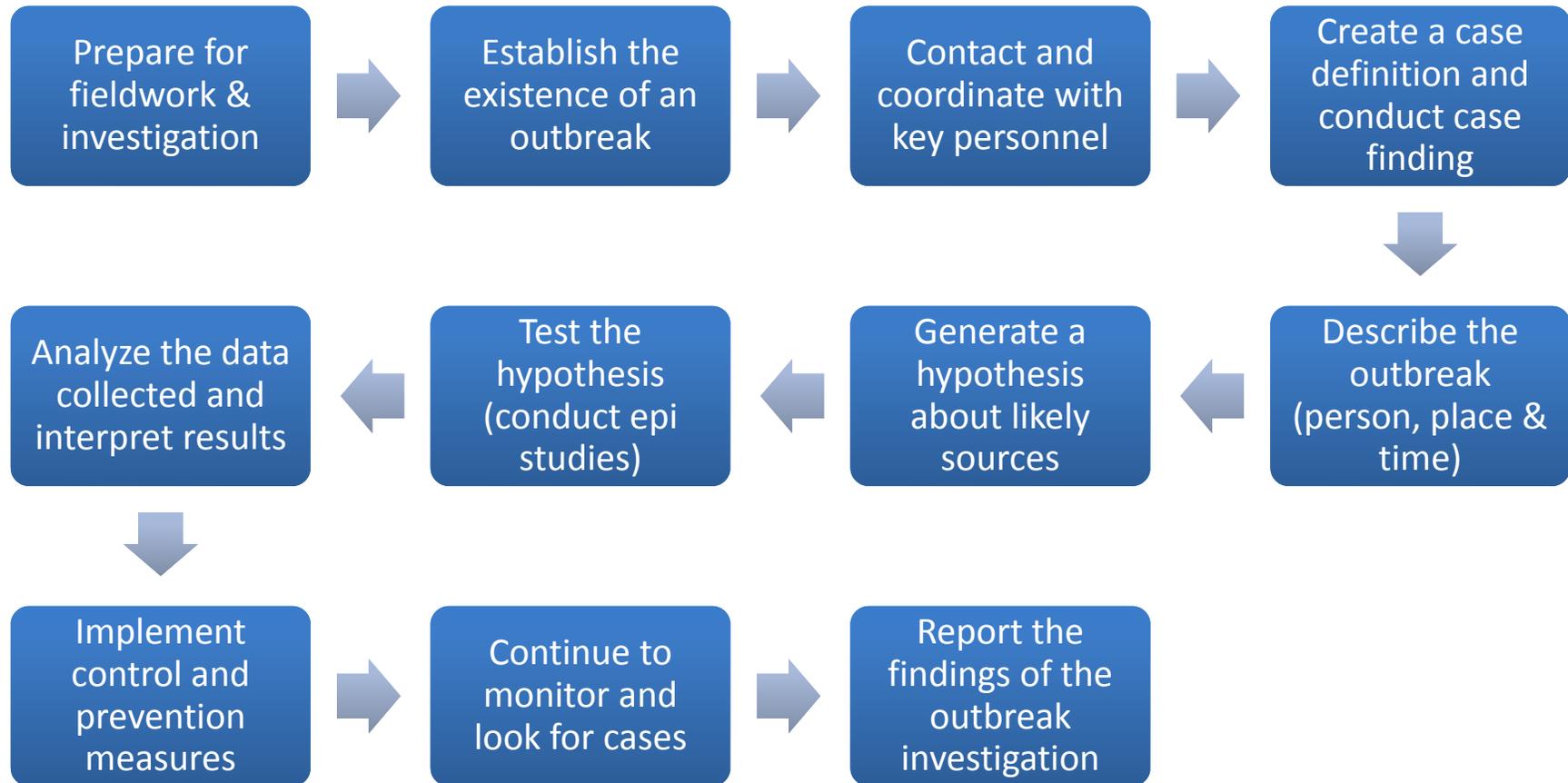
With 29 peo  
Colorado fa  
since 1924,



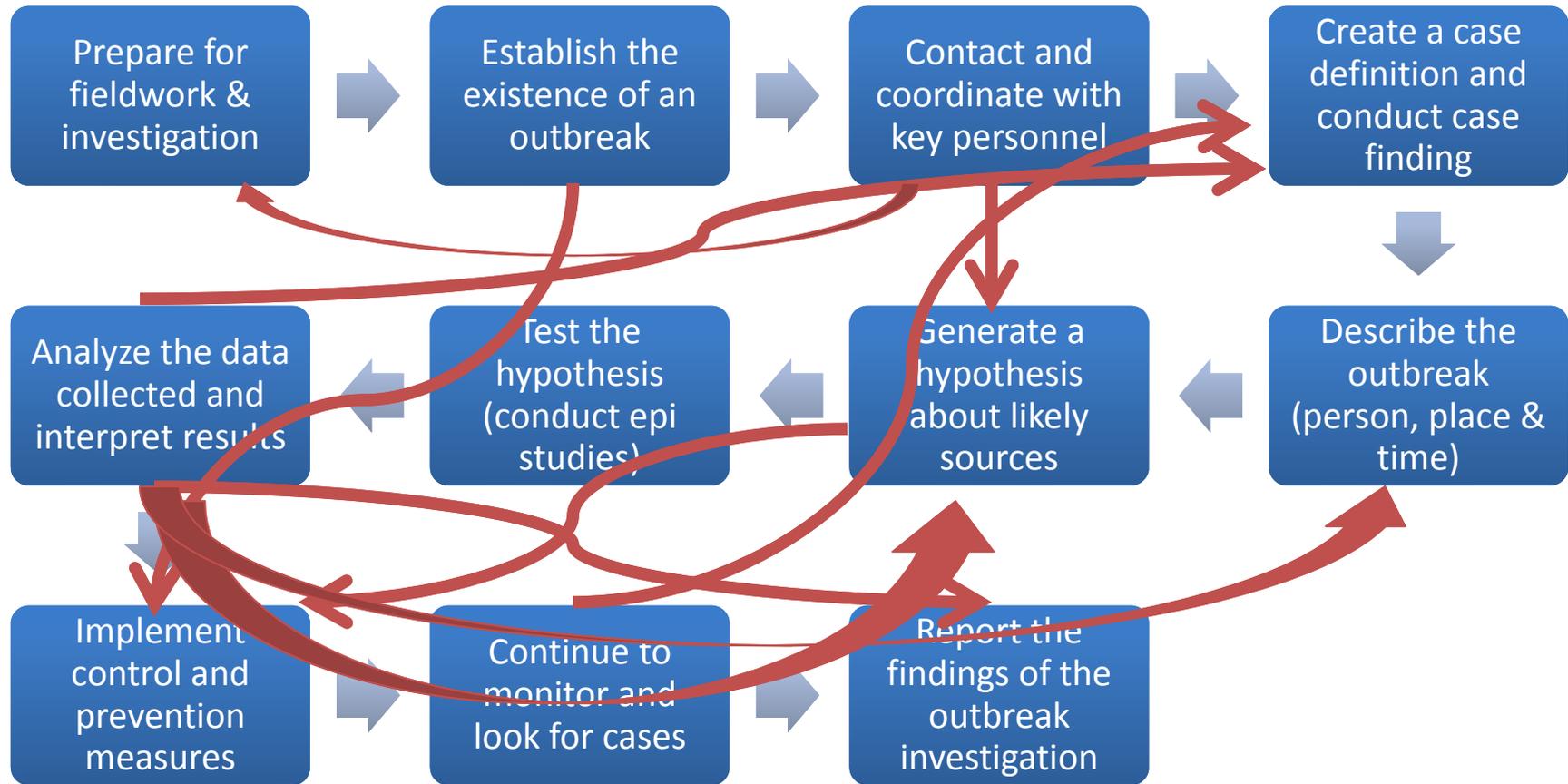
# Outbreaks

- Outbreak = more cases than expected
  - 1 case of measles is an outbreak, for some diseases it is much more
- Outbreak detection:
  - Surveillance data
  - Notification by school, healthcare, other facility
  - Notification by CDC, other states, other jurisdictions
  - The public
- Many activities are the same as for routine surveillance & investigation, but may require:
  - More extensive investigations
  - More extensive control measures
  - Increased urgency
  - Closer communication with partners and public
  - Close assessment of the situation – all outbreaks are different!

# Steps of an Outbreak Investigation



# Steps of an Outbreak Investigation



# MEDSIS, HEALTH SERVICES PORTAL, AND RESOURCES



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# MEDSIS

- Medical Electronic Disease Surveillance Intelligence System
- Arizona's communicable disease registry –
  - All reportable case & lab information is contained in MEDSIS
  - Exceptions: TB, STDs, HIV/AIDS, Hepatitis C
  - Since January 1, 2006
- Secure, web-based, available 24/7
- ADHS and local health departments share full access to information about cases in their jurisdictions
  - All county health departments have access
  - 3 tribal health departments have access
- Disease-specific investigation forms included for most diseases
- Infection preventionists at hospitals can report directly into MEDSIS
  - Replaces faxing or mailing reports
  - Report is immediately available to local HD & ADHS



Laura Erhart

Organization (Role): BANNER ESTRELLA MEDICAL CENTER (DE)

**COMMUNICABLE DISEASE REPORT - PATIENT**

Fields marked with an asterisk (\*) are required.

**Name:**
 \* First:  Middle:  \* Last: 
**Home Address:**
 Street:   
 Unit:   
 City:  State:  ZIP Code:   
 County:  Country:   
 Reservation: 
**Work Address:**
 Street:   
 Business/Facility Name:   
 City:  State:  ZIP Code:   
 County:  Country: 
**Demographics:**
 Occupation:   
 School Name:  Other:   
 \* Gender:   
 Race Category:   
 Ethnic Group:   
 \* Date of Birth:  /  /  (month/day/year)  
 Date of Birth is unknown

# Electronic Laboratory Reporting (ELR)

- Laboratories can submit reports electronically in HL7 format instead of via paper/fax
- Reports triaged by disease within the system
  - Reports for MEDSIS diseases attached to new or existing MEDSIS cases at ADHS (then accessible to local HD)
  - STD, HIV, TB, Cancer, Lead reports accessed by those ADHS programs, outside of MEDSIS
- Part of meaningful use CMS incentive payments for hospitals
- Current status
  - 4 laboratories actively reporting at this time
  - 21% of confirmed/probable 2012 MEDSIS cases contain ELR report
  - Many more are in the works!

# Data Management

- Data cleaning and case updates occurring regularly within MEDSIS (manually)
- Information about each case is added as we learn more
  - Investigations, new lab reports, etc.
- Data extracts are available to health department users
  - Basis for the ADHS data analyses & reports
- Infection preventionists can pull a report (line list) of all cases their facility entered in MEDSIS
- MEDSIS/ELR contact: [medsishelpdesk@siren.az.gov](mailto:medsishelpdesk@siren.az.gov)



# Health Services Portal



Run Application ▶

ADHSPortal



Leadership for a Healthy Arizona  
Arizona Department of  
Health Services



ADHSPortal

Health Alert Network (HAN)

Volunteers

Contacts

Preparedness ▼

EPI & Disease Control ▼

Response Center ▼

- Secure platform on which MEDSIS sits
- NOT the same as MEDSIS
- Document sharing, secure email between users, other features
- Each user has unique access to specific “areas”, allowing information to be posted and seen only by designated groups
- Usership is much broader than MEDSIS
  - Preparedness
  - Border Health
  - Epi & Disease Control
  - Many more...
- Health Services Portal Contact: [helpdesk@siren.az.gov](mailto:helpdesk@siren.az.gov)



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# Resources on ADHS Website

<http://www.azdhs.gov/phs/oids/epi> (Infectious Disease Epidemiology)

- Investigation Resources
  - Case definitions
  - Investigation manual (investigation information about specific diseases)
  - Disease Reporting & Investigation forms
  - Outbreak Investigation Resources (specific to Foodborne/Waterborne and Influenza-like Illness)
- Disease Reporting
  - Tables of reportable diseases
  - Rules & statutes
- Data, Statistics, and Reports
- Information about specific diseases

<http://www.azdhs.gov/lab/micro/index.htm> (Laboratory)

- Microbiology submission form
- Guide to Laboratory Services

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