Surveillance of Vaccine-Preventable Diseases (VPDs): Update 2017

Viral VPDs

November 28, 2017
Objectives

- Identify 3 main levels of the national surveillance system for VPDs
- Describe the concept of surveillance indicators
- Discuss the importance of surveillance and case identification
- Describe appropriate mechanisms for surveillance
- Describe the appropriate application of case definitions, clinical descriptions, and case classifications
- List the most appropriate laboratory tests for surveillance, and
- List epidemiologically important data to collect for surveillance.
Outline

- Mumps
- Polio and Acute Flaccid Myelitis (AFM)
- Varicella
- Measles
- Rotavirus
- Surveillance needs at various levels of public health
Mumps
Mumps

- Acute viral illness
- Typically causes unilateral or bilateral parotitis
- Possible to present only with non-specific respiratory symptoms or be asymptomatic with a subclinical infection
- Complications include:
  - Orchitis
  - Oophoritis
  - Meningitis
Mumps Transmission

- Transmitted by droplet secretions
- Requires close contact to spread from person to person
- People are most contagious from 2 days before until 5 days after parotitis onset
- People with non-specific respiratory symptoms or asymptomatic infections can also transmit disease
- Incubation period ranges from 12 to 25 days
- Outbreak is defined as 3 or more cases linked by time and space
Mumps Vaccine in the U.S.

- A component of the combined measles, mumps, and rubella vaccine (MMR)
- Advisory Committee on Immunization Practices (ACIP) Recommendations
  - 1977: First dose of MMR
  - 1989: Second dose of MMR for measles control
  - 2006: Second dose of MMR for mumps control
- Vaccine effectiveness estimated at 78% for 1 dose and 88% for 2 doses
  - Effectiveness estimates have large ranges (49%–91% for 1 dose, 66%–95% for 2 doses)
- Factors that may decrease vaccine effectiveness include:
  - Crowded or very close-contact settings
  - Behaviors that foster sharing of intimate air space or oral secretions
Mumps, Vaccine Era, United States, 1968–June 2017

Number of Mumps Cases

- 1977: 1st Dose MMR ACIP Recommendation
- 1989: Measles Control 2nd Dose MMR ACIP Recommendation
- 2006: Mumps Control 2nd Dose MMR ACIP Recommendation
- 2006 Midwest Outbreak
- 2009 Northeast Outbreak

Number of Mumps Cases by Year:
- 2006
- 2009
- 2015
- 2017

Number of Mumps Cases:
- 0
- 2000
- 4000
- 6000
- 8000
- 10000
- 12000
- 14000
- 16000
- 18000
- 20000
- 22000
- 24000
- 26000
- 28000
- 30000
- 32000
- 34000
- 36000
- 38000
- 40000
- 42000
- 44000
- 46000
- 48000
- 50000
- 52000
- 54000
- 56000
- 58000
- 60000

Year:
- 2003
- 2005
- 2007
- 2009
- 2011
- 2013
- 2015
- 2017
# Mumps Cases and Outbreak (OB) Related Data: 2011–2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
<th>Incidence rate (IR)</th>
<th>OB Cases</th>
<th>% of OB Cases</th>
<th>Jurisdictions w/OB cases</th>
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<td>12.2</td>
<td>3120</td>
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Source: National Notifiable Disease Surveillance System (passive surveillance); 2017 data as of October 7, 2017.
Characteristics of Reported Mumps Cases, United States, 2017

- Highest incidence: 18-22 years of age
- Age: median=21 years (IQR=15-31 years)
- Vaccination status: 75% ≥2 MMR doses

Source: National Notifiable Disease Surveillance System (passive surveillance); 2017 data as of October 12, 2017.
Vaccination status calculated as percent of persons with known vaccination status and for whom information on number of doses was reported.
IQR=Interquartile range
Outbreak Data: January 2016–June 2017

- 150 mumps outbreaks (9,200 cases)*
  - 39 (76%) jurisdictions reported outbreaks
  - Median number of cases per outbreak: 10 (IQR: 4-26)
  - Median age of case-patients: 21 years (IQR: 19-22)
  - 70% of case-patients with known vaccination history had two doses of MMR prior to infection
  - Outbreak/MMR3 dose used in 35 (23%) outbreaks
  - 75 (50%) outbreaks occurred in universities
  - 20 (13%) had ≥50 cases and accounted for 83% (n=7600) of the total case count

*Some outbreaks began in 2015 and continued into 2016.
IQR=Interquartile range
Outbreak dose: an MMR dose was administered without checking individual records prior to vaccination.
MMR3 dose: dose was administered after checking individual records and persons with documented 2 doses of MMR vaccine received a 3rd dose.
Recommended Outbreak Control Measures

- Define the population at risk and transmission settings
- Rapidly identify and vaccinate persons without presumptive evidence of immunity
- Consider excluding persons without presumptive evidence of immunity to prevent exposure and transmission
  - Considerations for recommending exclusion:
    - Increased risk of complications in susceptible persons
    - Contribution of unvaccinated persons to on-going transmission
  - Excluded students can be readmitted immediately after they are vaccinated
  - Students with one dose of MMR vaccination should be allowed to remain in school and are recommended to receive their second vaccine dose
Considerations for an Outbreak Dose of MMR

- October 2017 ACIP: Determined a third dose of MMR vaccine was safe and effective at preventing mumps and its complications in persons at increased risk because of an outbreak and recommended its use.

- Persons previously vaccinated and who are identified as at increased risk for mumps because of an outbreak should receive a dose of a mumps-containing vaccine:
  - Second dose for persons previously vaccinated with one dose
  - Third dose for persons previously vaccinated with two doses
Groups at Increased Risk due to a Mumps Outbreak – Considerations for Public Health Officials

- Number and distribution of cases
- Intense exposure settings likely to facilitate transmission
  - Schools, universities, correctional facilities, congregate living facilities
- Site(s) of ongoing transmission and place(s) of residence during outbreak
- Intensity and duration of close contact and social networks
- ACIP recommendation for high-risk persons
- Prompt identification of cases and reducing opportunities for close-contact transmission remain key factors in outbreak control
Mumps Laboratory Specimens

- Two types of specimens should be collected from all patients with clinical features compatible with mumps:
  - Buccal or oral swab specimen for molecular testing
  - Blood specimen for serologic testing

- Buccal or oral swab specimens
  - Enhance the ability to confirm a mumps infection
  - Used to determine a mumps genotype
  - Provide additional information to aid in epidemiologic investigations

- The determination of a genotype from a buccal or oral specimen is necessary to distinguish a vaccine reaction from a wild-type infection
Mumps Laboratory Diagnostic Tests

- Mumps RNA can be detected in a buccal or oral swab by either end-point or real-time reverse transcription PCR (RT-PCR)
- Mumps virus can be isolated in cell culture
- Mumps-specific IgM can be detected in serum
- Mumps-specific IgG seroconversion or a 4-fold rise in IgG titer is indicative of a mumps infection
  - Less likely to detect seroconversion or a 4-fold rise in previously vaccinated persons
- Specimens with a positive RT-PCR result are classified as confirmed while specimens that are IgM positive are classified as probable
Mumps IgM Serology

- No FDA-approved IgM assay (as of November 2017)
- Enzyme immunoassays (EIAs) and immunofluorescence assays (IFAs) are commonly used and the sensitivity among these assays can vary greatly
- Capture assays provide the best sensitivity but are not commercially available (as of November 2017)
- IgM detection is improved if serum specimens are collected on or after the third day following parotitis onset
- Patients who were previously vaccinated or previously infected may not have an IgM response, or it may be transient and undetectable due to the timing of specimen collection
- Parainfluenza viruses 1, 2, and 3, Epstein-Barr virus, influenza, adenovirus, and human herpesvirus 6 can interfere with mumps serologic assays and cause false positive results
Viral Specimen Collection

- For PCR assays, successful detection of mumps virus from buccal or oral swabs is dependent on timing of collection, proper collection technique, and proper storage of the specimen.
- Swabs should be collected as soon as mumps disease is suspected.
- RT-PCR for mumps has the greatest diagnostic sensitivity when the specimen has been collected within 3 days of parotitis onset.
- Buccal swabs yield the best viral sample, but in patients presenting with complications, it may be useful to collect urine or cerebrospinal fluid (CSF) specimens in addition to oral specimens.
Viral Specimen Collection

Proper technique for collecting a swab:

1. Massage the parotid gland for 30 seconds
2. Swab the parotid duct and buccal cavity by sweeping the swab along the cheek and gum between the upper and lower molars
Interpreting Negative Laboratory Results

Absence of a positive laboratory result does not rule out mumps

- Vaccinated individuals may shed virus for a shorter period and may shed smaller amounts of virus
- Vaccinated individuals may not have an IgM response at all or the response may be transient and not detected due to the timing of specimen collection
- In mumps outbreaks among 2-dose vaccine recipients, mumps virus RNA was detected by PCR in specimens from 30% to 71% of case patients when the specimens were collected within 3 days of parotitis onset; IgM was detected in 13% to 50% of these cases
For sporadic cases of parotitis with negative laboratory results, consider testing for other etiologies for the illness such as:

- Influenza virus
- Epstein Barr virus
- Adenovirus
- Parainfluenza viruses types 1, 2, and 3
- Bacteria (including *Staphylococcus aureus* and alpha hemolytic streptococcus)
Vaccine-Preventable Diseases Reference Centers
51 submitters representing 44 states
Sending Specimens to Reference Centers or CDC
Laboratory Guidance for Buccal Swab Specimens

- Sporadic Cases
  - Collect and test buccal swab
  - If RT-PCR positive, send to assigned reference center or CDC for genetic analysis

- Outbreaks
  - Send up to 5 buccal swabs or PCR-positive specimens per week for testing to assigned reference center or directly to CDC (batched specimens are acceptable)
  - If an additional outbreak is identified or if the outbreak spreads from the original institution or community into other settings, send up to 5 buccal swabs or PCR-positive specimens per week per outbreak to assigned reference center or CDC for genotyping

- Samples to CDC
  - Complete SF 50.34 for each sample going to CDC (available on CDC website http://www.cdc.gov/laboratory/specimen-submission/index.html)
  - Provide clinical information including date of disease onset and immunization history
Mumps Summary

- Steady increase in the number of reported cases since 2011
- Numerous large mumps outbreaks in the United States have occurred between 2011 and 2017
  - Primarily in young adults vaccinated with 2 doses of MMR vaccine
  - Settings with intense, close-contact exposures, such as college campuses
Polio & Acute Flaccid Myelitis (AFM)
Outline

- Clinical background and case definition
- Epidemiology and surveillance
- Laboratory investigation and specimen collection
- Conclusions
Acute Flaccid Myelitis (AFM)

- Rare condition that affects the nervous system, specifically the spinal cord
- Characterized by sudden onset of weakness or loss of muscle tone in one or more arms or legs
- May also present with facial droop or weakness, difficulty moving eyes, droopy eyes, difficulty swallowing, or slurred speech
- Specifically involves neurons (gray matter) of the spinal cord
- Can have many causes:
  - Viral infections (e.g., poliovirus, West Nile virus)
  - Environmental toxins
  - Genetic disorders
AFM Case Definitions

- Case definition modified from the initial 2014 investigation to better determine occurrence of AFM and to add sensitivity

- National standardized case definition adopted by CSTE in 2015 and updated in 2017
  - **Confirmed case** of AFM: a patient with acute onset of flaccid limb weakness, AND an MRI showing a spinal cord lesion largely restricted to gray matter and spanning one or more spinal segments. A normal MRI performed in the first 72 hrs of limb weakness does not rule out AFM.
  - **Probable case** of AFM: a patient with acute onset of flaccid limb weakness, AND cerebrospinal fluid (CSF) with pleocytosis (white blood cell count >5 cells/mm³).

Sources:

Clinicians should report all suspected cases of AFM, or patients with flaccid limb weakness, to local or state health departments, who will share the information with CDC.

- Use the patient summary form (type “CDC AFM data collection form” into your search engine) and attach reports of the MRI findings and other clinical information like neurology and infectious disease consult notes.
- All case classification will be done at CDC by national experts in AFM surveillance for consistency.

**Acute Flaccid Myelitis: Patient Summary Form**

- Please send the following information along with the patient summary form (check information included):
  - History and physical (H&P)
  - MRI report
  - MRI images
  - Neurology consult notes
  - EMS report (if done)
  - Infectious disease consult notes (if available)
  - Vaccination record
  - Diagnostic laboratory reports

1. Today’s date __/__/____ (mm/dd/yyyy)
2. State assigned patient ID: __________________________
3. Sex: ☐ M ☐ F
4. Date of birth__/__/____ Residence: __________ State: __________ G. County: __________
5. Race: ☐ American Indian or Alaska Native ☐ Asian ☐ Black or African American ☐ Native Hawaiian or Other Pacific Islander ☐ White (check all that apply) ☐ Not Hispanic or Latino
6. Ethnicity: ☐ Hispanic or Latino
7. Date of onset of limb weakness __/__/____ (mm/dd/yyyy)
8. Was patient admitted to a hospital? ☐ Yes ☐ No ☐ Unknown
9. Date of admission to first hospital __/__/____
10. Date of discharge from last hospital __/__/____ (or still hospitalized at time of form submission)
11. Did the patient die from this illness? ☐ Yes ☐ No ☐ Unknown
12. If yes, date of death __/__/____
Number of Confirmed U.S. AFM Cases Reported by Month of Onset, August 2014 – August 2017

Number of confirmed cases

Month of onset

2014
120 cases
2015
22 cases
2016
146 cases
2017
17 cases

Source: CDC AFM surveillance (passive surveillance); 2016 and 2017 data is preliminary (as of September 26, 2017) and subject to change.

2 reports with missing onset; hospitalization date used as proxy.
Diagnostic Testing for AFM

- Despite testing many specimens since 2014, no consistent pathogen has been identified from patients with AFM
- CDC is expanding testing to include potential infectious and non-infectious causes, including immune-mediated mechanisms
- CDC will no longer perform diagnostic testing for enteroviruses or meta-genomic sequencing for suspected AFM cases
Clinician Specimen Collection

- When a suspect case of AFM is identified:
  - Clinicians should collect specimens as early in course of illness as possible for diagnosis and clinical management
  - Clinicians should work with their local or state health departments to submit additional specimens to CDC
Specimen Collection

- Serum
- CSF
- Whole blood (collected within 24 hours of CSF)
- Two stool samples, collected 24 hours apart to rule out polio

*Respiratory specimens will be accepted for genotyping ONLY if they tested positive for entero/rhinovirus at an external laboratory.
Specimen Collection and Shipping

- Ship specimens within 24 hours of collection to ensure optimal results
- Detailed information on specimen collection and shipping can be found on the CDC AFM website:
  - [https://www.cdc.gov/acute-flaccid-myelitis/hcp/instructions.html#table](https://www.cdc.gov/acute-flaccid-myelitis/hcp/instructions.html#table)
- Clinician specific “job aid” is available on website to help with the process

Job Aid for Clinicians

How to send information about a suspected AFM case to the health department
AFM Summary

- No consistent pathogen detected despite hundreds of specimens tested
- No specific risk factors have yet been identified
- Suggested prevention measures to prevent polio and West Nile virus are encouraged
  - Make sure patients are up to date on polio vaccination
  - Use mosquito repellent
  - Practice good hand hygiene
- AFM, characterized by flaccid weakness and involvement of the spinal cord grey matter, remains a rare condition
- Vigilance in identification and reporting cases to the health department and CDC will improve understanding of this condition
Varicella
Varicella Vaccination Program

- Annual varicella disease burden in the U.S. before varicella vaccine licensed in 1995
  - About 4 million cases
  - >10,000 varicella-related hospitalizations
  - 100–150 deaths

- Routine varicella vaccination program
  - 2 doses recommended for children
    - Dose 1: 12–15 months of age
    - Dose 2: 4–6 years of age
Varicella Vaccination Coverage in the U.S.

- As of 2015, the one-dose coverage in children 19–35 months of age is 92%
- As of 2015, the two-dose coverage in adolescents 13–17 years of age is 83%
  - One-dose only coverage in adolescents 13–17 years of age is 12%
Varicella Surveillance in the U.S.

- 90% reductions in incidence, hospitalizations, and deaths during 1-dose varicella vaccination program (1996–2005)
- Continued reduction in varicella incidence during the 2-dose varicella vaccination era (2006–present)
  - 85% decline from end of 1-dose era to 2013–2014
  - Largest decreases in children and adolescents aged 5–14 years in the 2-dose vaccination era
- The number of varicella outbreaks, numbers and rates of hospitalizations, and deaths also continue to fall in the 2-dose era
Improving National Varicella Surveillance

- 38 states are conducting varicella case-based surveillance
- 52 jurisdictions are funded through CDC’s Epidemiology and Laboratory Capacity (ELC) cooperative agreement, which provides opportunities for improving varicella surveillance
Key Variables for Varicella Case-Based Surveillance

- Age
- Disease severity
  - Number of lesions
  - Hospitalization
- Case status
  - Confirmed or probable
- Laboratory testing
- Vaccination status
  - Number of doses received
- Association with an outbreak
Varicella Outbreak Surveillance in the U.S.

- Monitor impact of 2-dose varicella vaccination program
- Varicella outbreak definition
  - 5 or more epidemiologically linked cases in one location
- Varicella cluster definition
  - 3–4 epidemiologically linked cases in one location
Varicella Case Definition

- An illness with acute onset of diffuse, generalized maculopapulovesicular rash without other apparent cause

- Breakthrough disease
  - Due to wild-type varicella-zoster virus
  - In a vaccinated person more than 42 days after vaccination
  - Occurs in about 15% persons vaccinated with 1 dose and less than 5% vaccinated with 2 doses
  - Generally mild with fewer lesions, shorter duration, and maculopapular rash with few or no vesicles
Laboratory Confirmation of Varicella

- **Virologic**
  - Polymerase chain reaction (PCR)
  - Direct fluorescent antibody (DFA)
  - Viral culture

- **Serologic**
  - Varicella IgM antibody positive
  - Seroconversion for IgG
  - Significant rise in IgG antibody
Laboratory Confirmation of Varicella

- Virologic methods are preferred
  - PCR is the best choice because it is the most sensitive and specific
  - DFA can be used if PCR is unavailable

- Vesicular fluid or scabs from skin lesions are the preferred specimens for laboratory confirmation of varicella

- Commercially available IgM tests are not reliable for diagnosis

- Serology not useful in vaccinated persons
  - IgM may not be present
  - 4-fold rise may not occur

- The CDC varicella laboratory has developed a reliable IgM capture assay and can assist with laboratory evaluation of unusual cases
Summary

- Further reductions in varicella morbidity and mortality have occurred during the 2-dose varicella vaccination program.

- Reductions in number of varicella cases provide opportunities for improving varicella case-based surveillance.
  - NNDSS data are primary source for monitoring impact of vaccination program.
  - Monitoring surveillance indicators for varicella will help improve surveillance.
  - Monitoring varicella outbreaks important for documenting impact of second-dose recommendation.

- Laboratory testing for varicella increasingly important in vaccine era because of atypical presentation.
  - Preferred method for diagnosis is PCR testing of vesicular fluid or scabs from skin lesions.
Measles
Measles in the U.S.

- In March 2000, the Pan American Health Organization (PAHO) and other experts concluded that measles was no longer endemic in the U.S.
- In 2011, PAHO and the United States verified and documented the continued elimination of measles in the U.S.
- In 2015, PAHO and the United States verified and documented the continued elimination of measles in the U.S.
Measles Case Definition

- Generalized macropapular rash for 3 days or more, and
- Temperature of 101 °F (38.3 °C) or higher, and
- Cough, or coryza, or conjunctivitis
Measles Vaccine Coverage, United States, 1993–2014

Source: National Immunization Survey
Reported Incidence of Measles by Year, United States, 2001–2015

*Rate of measles per million population
Critical Data for Measles Case Investigation

- Demographic and clinical data
- Complete immunization history
- Laboratory confirmation
- Source of infection:
  - Contact with other known cases
  - Opportunities for exposure to unknown cases
Opportunities for Exposure to Unknown Measles Cases

- Schools
- Childcare facilities
- Contact with international travelers or visitors
- Tourist locations or settings
- During air travel including at airports
- Healthcare settings
Contacts of Measles Cases

- Infectious period 4 days before to 4 days after rash onset
- Contacts without evidence of measles immunity should be vaccinated as soon as possible, ideally within 72 hours
- Unvaccinated contacts should be asked to quarantine themselves for 21 days after last exposure and monitor symptoms daily
Contacts of Measles Cases

- Immune globulin can be administered within 6 days of exposure and is indicated for:
  - Household or other close contacts without evidence of immunity, particularly:
    - Contacts younger than 1 year of age
    - Pregnant women
    - Immunocompromised persons
Rotavirus
Rotavirus

- Incubation period of 1–3 days
- Vomiting often precedes the onset of diarrhea
- Severe, dehydrating infection occurs primarily among children 3–35 months of age
- Gastrointestinal symptoms generally resolve in 3–7 days
Rotavirus

- Shed in high concentrations in the stool
- Transmitted primarily by the fecal-oral route
- Highly communicable
Rotavirus Vaccine in the U.S.

- Live, oral, human-bovine reassortant rotavirus vaccine
  - RV5 (RotaTeq) licensed in the U.S. in 2006
  - Recommended for routine vaccination of infants at 2, 4, and 6 months of age

- Live, oral, attenuated monovalent rotavirus vaccine
  - RV1 (Rotarix) licensed in the U.S. in 2008
  - Recommended for routine vaccination of infants at 2 and 4 months of age
Rotavirus Surveillance in the U.S.

- Surveillance is needed to:
  - Monitor the impact of vaccination
  - Evaluate vaccine effectiveness in field use
  - Identify and determine the causes of vaccine failure
  - Monitor possibly emerging strains
  - Identify groups in which vaccination coverage may be inadequate
  - Monitor the safety of rotavirus vaccines

- Surveillance at national level should focus on:
  - Monitoring trends of severe rotavirus disease
  - Viral strain surveillance
Rotavirus Surveillance in the U.S.

- New Vaccine Surveillance Network (NVSN)
  - Conduct active, population-based surveillance for rotavirus-associated medical encounters among children
  - 7 medical centers in Tennessee, New York, Ohio, Texas, Missouri, Washington State, and Pennsylvania
  - Identification and investigation of acute gastroenteritis cases
  - Analyses to estimate disease burden, vaccine impacts, and vaccine effectiveness
Rotavirus Surveillance in the U.S.

- Laboratory-based sentinel surveillance systems
  - National Respiratory and Enteric Virus Surveillance System
  - National Rotavirus Strain Surveillance System
- National health utilization datasets
Documentation of Rotavirus Vaccine Impact

- Decreases in rates for acute, all-cause gastroenteritis hospitalization for children <5 years of age
- Decreases in rotavirus-coded hospitalization for children <5 years of age
- Decreases in rotavirus gastroenteritis emergency department visits
- Lower rate of rotavirus- or unspecified-gastroenteritis hospitalization among household members having a vaccinated child
- Biennial disease pattern observed following rotavirus vaccine introduction
- Rotavirus case investigations are usually not warranted, however, outbreaks among childcare or school settings could indicate vaccine coverage gaps and possible waning immunity
- Surveillance will continue to adapt to new epidemiologic and surveillance trends
Surveillance Needs in the Context of a Control Program
Due to effective immunization programs, diseases that were once major causes of death and morbidity among children in the United States have decreased in frequency.

A remaining challenge is to identify factors that allow remaining cases of vaccine-preventable diseases to occur.

It is important to extend the success of eliminating endemic measles, rubella, and polio to other vaccine-preventable diseases.

Vaccine-Preventable Diseases
Disease Reporting and Case Notification

- Reporting requirements for diseases and conditions of public health concern
  - Mandated by state laws or regulations
  - Differ by state
  - Rely on healthcare providers, laboratories and other public health personnel to report the occurrence of disease and conditions

- Council of State and Territorial Epidemiologists (CSTE)
- National Notifiable Diseases Surveillance System (NNDSS)
Public Health Uses of Surveillance Data: Local Level

- Disease control activities
  - Prophylaxis
  - Vaccination
- Standardized case definitions
The Manual for the Surveillance of Vaccine-Preventable Diseases provides current guidelines for those directly involved in surveillance of vaccine-preventable diseases (VPD), especially personnel at the local health departments. For each of the vaccine-preventable diseases, this manual includes a chapter describing the importance of rapid case identification; the importance of surveillance; disease reduction goals; case definitions (including clinical description and case classifications); epidemiologically important data to be collected during case investigation; activities for enhancing surveillance; activities for case investigation; and activities for outbreak control. Other
Case Definitions for Public Health Surveillance

National Notifiable Diseases Surveillance System (NNDSS)

Current and Historical Conditions | NNDSS

Search Conditions

Notifiable Condition Lists

2017

Get Notifiable List by Year

Infectious Non-Infectious Outbreaks

A

Acanthamoeba disease (excluding keratitis)
Acanthamoeba keratitis
Acquired Immunodeficiency syndrome
AIDS
AIDS/HIV

M

Malaria
Marburg virus
Measles
Melioidosis
Meningitis, aseptic
Critical Data Elements

- Demographic data
- Clinical data
- Vaccination history
- Laboratory test results
Chain of Transmission

Source → Index Case → Secondary
Public Health Uses of Surveillance Data: State Level

- Evaluate the effectiveness of disease control programs
- Formulate and evaluate immunization policy
Disease in the Vaccine Era

- Warning to public health officials
  - Other susceptible individuals who should have been vaccinated
  - Waning immunity in vaccinated individual

- Public health officials need to ask:
  - Was the person vaccinated? (And if not, why not?)
  - Were there missed opportunities to vaccinate?
  - Is there a more widespread problem?
Uses of Surveillance Data: National Level

- Formulate national immunization policy
- Evaluate the effectiveness of immunization programs
- Evaluate the effectiveness of vaccines
- Document the impact of national immunization efforts
Surveillance Requirements

- Depends on stage of the disease control program
  - Early program needs when there are many cases vs. late program needs when there are only a few cases left
- Regardless of stage of disease control, need to ensure adequate surveillance for vaccine adverse events for any vaccine currently in use
Surveillance Requirements: Before Vaccine Availability

- Baseline of reported disease
- Complete reporting is not essential
- Year-to-year consistency
- Aggregate reporting
Surveillance Requirements: Disease Control

- Enhanced surveillance
  - Document vaccine impact
  - Evaluate effectiveness
  - Monitor progress toward disease elimination

- Detailed information from individual case investigations
  - Vaccination status
  - Laboratory confirmation

- Highly specific case definitions
Enhanced Surveillance: Extremely Low Incidence

- Importance of data quality and completeness
- Organism may no longer be circulating
  - Molecular typing methods can help document this
Summary

- Surveillance activities must be designed to fit the public health need
- Baseline data needed for diseases for which a new vaccine is available
- Detailed, individual case investigations for disease with a higher level of control through vaccination programs
Resources

- **VPD Surveillance Manual**
  - Guidelines for those directly involved in the surveillance of VPDs
  - Includes chapters for each VPD, surveillance indicators and data analyses, laboratory support for surveillance, and appendices with disease-specific worksheets and instructions

- **VPD Reference Centers**
  - Four public health laboratories that work with APHL ([aphl.org](http://aphl.org)) and CDC to provide quality testing to other public health jurisdictions free of charge
  - Provide testing for measles, mumps, rubella, varicella-zoster, *B. pertussis*, *S. pneumoniae*, *N. meningitidis*, and *H. influenzae*

- **National Notifiable Disease Surveillance System**
  - Public health case definitions for all infectious conditions under national public health surveillance: [www.cdc.gov/nndss/conditions/](http://www.cdc.gov/nndss/conditions/)
Resources

- Collecting a buccal swab for mumps (video)

- Investigation and control of mumps outbreaks on college campuses: Indiana, 2016

- SF 50.34 (CDC Specimen Submission Form)
  - [www.cdc.gov/laboratory/specimen-submission/index.html](http://www.cdc.gov/laboratory/specimen-submission/index.html)

- Specimen collection and shipping information for AFM
  - [www.cdc.gov/acute-flaccid-myelitis/hcp/instructions.html#table](http://www.cdc.gov/acute-flaccid-myelitis/hcp/instructions.html#table)

- CDC Varicella Laboratory
  - [www.cdc.gov/chickenpox/lab-testing/cdc-vzv-lab.html](http://www.cdc.gov/chickenpox/lab-testing/cdc-vzv-lab.html)
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Thank you!