Multi-State Outbreak of Measles in the United States, 2018–2019

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Texas Immunization Conference, Measles Plenary Session
October 23, 2019

Measles

- Acute febrile rash viral illness
- Transmitted by direct contact with infectious droplets or airborne spread
- Most contagious of the vaccine preventable diseases

Clinical Presentation
Measles Complications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rate</th>
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<tbody>
<tr>
<td>Diarrhea</td>
<td>8%</td>
</tr>
<tr>
<td>Otitis media</td>
<td>7-9%</td>
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<tr>
<td>Pneumonia</td>
<td>1-6%</td>
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<tr>
<td>Hospitalized</td>
<td>1 in 4 cases</td>
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<tr>
<td>Encephalitis</td>
<td>1 per 1,000 cases</td>
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<tr>
<td>Death</td>
<td>1 - 3 per 1,000 cases</td>
</tr>
<tr>
<td>Subacute Sclerosing Panencephalitis (SSPE)</td>
<td>1 per 100,000 cases 7-10 years after measles</td>
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Complications are more common in children < 5 years and adults

Annual Measles Disease Burden in the U.S. in the Decade Prior to Vaccine (1950s)

- ~3-4 million measles cases in the U.S. annually (of which ~500,000 were reported)
- 48,000 hospitalizations
- 1,000 persons had permanent brain damage from measles encephalitis
- 450-500 deaths

Measles Vaccine
**Measles Vaccine**

- Licensed in 1963 in the U.S.

- Combination measles-mumps-rubella (MMR) vaccine licensed in 1971

- Vaccine Effectiveness:
  - 1-dose: ~93%
  - 2-doses: ~97%

- Excellent safety profile over past 50 years

- Since 2000, more than 21 million lives saved globally because of measles vaccination

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**MMR Vaccine Routine Recommendations in the U.S.**

- Children and Adolescents
  - One dose at 12–15 months of age and a second dose at 4–6 years of age

- Adults without evidence of measles immunity
  - Two doses for high risk adults (i.e., healthcare personnel, students in post-secondary education, international travelers)
  - One dose (all other adults)

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**Measles Epidemiology and National Vaccine Coverage**
Measles Cases Increased 300% Globally in 2019

Source: WHO

Measles Was Declared Eliminated in the United States in 2000

* Data are preliminary for 2019

Number and Incidence of Reported Measles Cases – U.S., 2001 –2019* (N=3849)

*Source: National Notifiable Diseases Surveillance System (passive surveillance); 2018 and 2019 data as of October 3, 2019
Top countries as sources for importations of measles into the U.S.:  
- Philippines 
- Israel 
- Ukraine 
- Thailand 
- United Kingdom 
- Japan
Most Measles Cases in the U.S. are Among Unvaccinated Persons

Measles Case-Patient Characteristics, 2019 (N=1250)

- Median age: 6 years
  - 51% of all cases in 16m to 19yo age group

- 1108 (89%) of all reported cases were unvaccinated or had an unknown vaccination status
  - 783 (70%) known to be unvaccinated; median age 4 years
  - 235 (19%) unknown; median age 36 years

- 119 (10%) cases hospitalized
  - 60 (5%) reported pneumonia

- Only 6% of the total number of cases in 2019 were internationally imported (majority of cases have been US-acquired cases)

Reported Measles Outbreaks* – U.S., 2019†

- 22 measles outbreaks were reported in 2019
  - Size: Median of 6 cases/outbreak (range: 3—646)
  - Duration: Median 27.5 days/outbreak (range: 5—230)

- 8 of the 20 outbreaks (a cluster of 3+ cases) were associated with under-immunized, close-knit communities and accounted for 86% of all cases

- 70% of importations into the U.S. were not associated with outbreaks
MMR Vaccination Coverage is High among Children in Kindergarten
United States, 2017-2018

- Median 2-dose MMR coverage: 94.3%
  - Range: 81% to ≥99%
- 27 states reported coverage <95%
  - 3 states and DC reported coverage <90%

Vaccine Hesitancy

New York Outbreaks were in Closed Social Communities, with Little Spread Beyond

- 1,114 cases total; New York City (N = 702) and New York State (N = 412)
- More than 90% of cases associated with Ultra-Orthodox Jewish community
  - Most rabbinical leaders support immunization
  - However, some communities have low or delayed immunization uptake
  - Frequent travel back and forth to religious community in Israel
- Closed social groups with little outside interaction
  - Frequent large gatherings
  - Children attend religious schools
  - Arranged marriage occurs beginning at age 18; family size often up to 10-14 children
Pockets of Low Vaccination

- Close-knit, under-vaccinated communities a key vulnerability
- Each community is unique, with distinct factors affecting vaccination
  - Isolation or insularity
  - Localized misinformation
  - Access issues
  - Distrust of public authorities

Misinformation Is a Significant Factor Fueling Outbreaks

- Misinformation about MMR vaccine is a contributing factor to New York outbreaks
- Some organizations deliberately targeting close-knit communities with false information
- CDC and its partners are working with social media companies to provide access to credible, accurate information

Hot Spots of Vaccine Hesitancy

- When small communities have lower rates of vaccination, it can create a foothold for diseases to spread
- The reasons specific communities may be hesitant to vaccinate are diverse
- Public health and medical providers must work together to identify pockets of reduced vaccination rates
Numerous Schools in New York Have Low MMR Vaccination Rates

New York Schools with <75% MMR Vaccination Coverage, 2017 to 2018

Public Health Response

Robust Multi-Agency Effort To End the Outbreak in New York

- Operating in Incident Management Structure (CDC, NYC, NYS)
  - >350 staff working on response
- Promoting vaccination of travelers and prevention of importation
- Providing science-based information and targeted communications resources
- Establishing collaborations with key stakeholders in affected communities
  - Religious organizations, healthcare providers, health centers, summer camps
- Implementing outbreak control measures
  - Case confirmation and genotyping
  - Isolation, quarantine, post-exposure prophylaxis, active monitoring
  - Offering vaccine to the affected community
Public Health Authorities Increased MMR Coverage in Outbreak-Affected Neighborhoods

- Unvaccinated children were excluded from schools with low vaccine coverage in affected neighborhoods
- Public health emergency orders
  - Vaccination of unvaccinated individuals
  - Prohibiting exposed susceptible persons from being in public areas
- Requirements for vaccination of campers and staff at summer camps
- Legislation eliminating the religious exemption for vaccination from requirements for school and licensed day care
- State is conducting school audits targeted to outbreak areas
- Emergency rules issued to address misuse of medical exemptions

Community Partner Engagement

Operationalizing the Whole Community Approach to emergency management by:

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<tr>
<th>Building coalitions of community partners</th>
<th>Connecting to pre-emergency initiatives</th>
<th>Meeting community where they are</th>
<th>Providing technical assistance for partner projects</th>
<th>Connecting partners with resources + relationships</th>
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Vaccinate Confidently is CDC’s strategic framework for strengthening vaccine confidence and preventing outbreaks of vaccine preventable diseases in the United States
Protect communities
Use every tool available to find and protect communities at risk using tailored, targeted approaches

Empower families
Ensure parents are confident in decision to vaccinate by strengthening provider-parent vaccine conversations

Stop myths
Use local partners and trusted messengers, establish new partnerships to contain the spread of misinformation, and educate critical stakeholders about vaccines

Measles Elimination

Measles Elimination in the U.S.
- Elimination is defined as interruption of continuous measles transmission lasting >12 months
- Declared in 2000 and achieved due to:
  - High two-dose vaccine coverage
  - High quality measles surveillance and response
  - Improved measles control in the World Health Organization Region of the Americas
- Elimination does not mean “gone forever” - imported cases and limited spread occur every year
- The U.S. stopped measles virus circulation in <1 year, and likely maintained elimination status (which will be officially determined by a PAHO regional verification committee)
The United States, with a population of 288 million, is the largest country to have documented sustained interruption of endemic measles. The US experience demonstrates that endemic measles can be eliminated in a large, diverse, developed country with a routine 2-dose measles vaccine strategy. The US experience in elimination plus those of other countries that have interrupted endemic measles transmission support the scientific basis for the feasibility of global measles eradication. We hope that the experience of the United States and other countries that have interrupted endemic measles will encourage other countries to accelerate efforts to better protect their populations from this disease.

Why Maintaining Measles Elimination Is So Important

“Although the U.S. stopped measles virus circulation in <1 year, and likely maintained elimination status, these outbreaks reinforce that:

–Local data are essential to enable targeted prevention efforts
–Relationships with local communities are crucial
–Easy, convenient access to vaccines remains a perennial need
–Addressing the spread of misinformation, especially in close-knit communities, is important

Summary

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Thank you

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-222-4268

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