Measles Review for Providers

Responding to New York State’s largest outbreak since measles elimination

November 28, 2018
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Measles 101

A brief overview
History of Measles in the United States

• Prior to 1963, measles occurred worldwide in an endemic or epidemic pattern.
• Nearly all children got the measles by the time they were 15 years of age.
  • An estimated 3-4 million cases occurred annually
• When measles became a nationally notifiable disease in 1912, an average of 6,000 measles deaths were reported each year.
• In the decade before 1963, it is estimated that annually:
  • 400-500 people died
  • 48,000 people were hospitalized
  • 1,000 people suffered encephalitis (brain swelling)
History of Measles in the United States

• In 1963, measles vaccine was introduced.
• In 1989, two-dose MMR vaccine schedule was introduced.
• In 2000, measles was declared eliminated from the United States, meaning an absence of endemic measles transmission for 12 months or longer.

Source: CDC, www.cdc.gov/measles
History of Measles in the United States

- Elimination has been attributed to a highly effective vaccination program in the US and better measles control.
- Since 2000, outbreaks have been reported throughout the US, most commonly related to international travel and communities with poor vaccination rates.

The number of US reported cases in 2018 is similar to recent years and is in the expected range.

Centers for Disease Control and Surveillance:
*Cases as of December 30, 2017. Case count is preliminary and subject to change.
**Cases as of November 3, 2018. Case count is preliminary and subject to change. Data are updated monthly.
Source: Morbidity and Mortality Weekly Report (MMWR), Notifiable Diseases and Mortality Tables.
Measles Virus

- Measles is caused by a single-stranded, enveloped RNA virus with 1 serotype
- Member of the genus Morbillivirus in the Paramyxoviridae family
  - Same family as RSV, mumps, and parainfluenza viruses
- Humans are the only natural hosts of measles virus

Source: WHO, www.who.int

Source: CDC, www.cdc.gov/measles
Measles Transmission

• Measles is one of the most contagious infections
• Measles is spread via the airborne route
• Measles can *live for up to 2 hours* in the airspace where an infected person breathed, coughed or sneezed
• Measles is so contagious that if one person has it, 90% of the people close to that person who are not immune will also become infected
• Infected people can spread measles to others from 4 days before through 4 days after the rash appears
Measles Presentation

• Classic Presentation:
  • Fever, rash, and the “three C’s”:
    • Cough
    • Coryza (redness and swelling of nasal mucosa)
    • Conjunctivitis (red, watery eyes)

• Can also have:
  • Koplik spots (scattered blue-white tiny spots on a bright red background) may appear inside the mouth
  • Malaise
  • Diarrhea
  • Anorexia
  • Lymphadenopathy
Measles Complications

- Children younger than 5 years of age and adults older than 20 years of age are more likely to suffer from measles complications
- Acute otitis media (ear infections)
  - Occurs in about 1 in 10 children with measles
  - Can result in *permanent hearing loss*
- Pneumonia
  - As many as 1 in 20 children with measles gets pneumonia, the most common cause of death from measles in young children
Measles Complications

• Subacute Sclerosing Panencephalitis (SSPE)
  • SSPE is a rare but fatal complication of measles
  • May occur 7-10 years after a natural measles infection
  • Type of brain swelling that is progressive and has no known cure
  • Most individuals with SSPE will die within 1-3 years of diagnosis, but some
    have a more rapidly progressing disease progression that leads to death
    within 3 months of diagnosis
  • Risk of developing SSPE may be higher in those who are infected with
    measles before the age of 2 years
    • The incidence of SSPE declined by at least 90% in countries that have
      practiced widespread measles vaccination
    • Highlights the importance that children should receive their first MMR
      vaccination between age 12-15 months
Measles Prevention = Vaccination

- Getting the measles vaccine is the best way to prevent measles at all times, but especially during an outbreak
  - One dose of measles is about 93% effective at preventing the measles if exposed to the virus.
  - Two doses of measles vaccine are about 97% effective
  - About 3% of people who have received 2 doses of MMR vaccine are still at risk of getting the measles if exposed to the virus, but fully vaccinated people who get the measles are:
    - Much more likely to have a milder illness
    - Much less likely to spread measles to other people

Stock Photo: Sherry Yates Young
Current Outbreak Status
Current Outbreak

In New York State, there are currently:

• 96 cases of measles in Rockland County (New Square, Spring Valley, Monsey, New City)
• 50 cases in New York City (Williamsburg, Borough Park, and Bensonhurst, Brooklyn)
• 6 cases in Orange County (Kiryas Joel)

Rockland County:
• 8 separate index cases, all with exposures to ongoing measles outbreak in Israel

Orange County:
• All cases linked to outbreak in Rockland County
Current Outbreak

*Status of "Orange" indicates Orange County Cases
Current Outbreak: Age Distribution

Range = 4 months to 62 years
Mean Age = 11.0 Years
Median Age = 6.5 Years
Current Outbreak: Age Distribution Over Time
Measles Cases in New York State, 1997-2018*

- The current outbreak is the largest in New York State since the 1990’s, prior to elimination of measles in the United States.
- New York City outbreak in 2013:
  - Unvaccinated traveler who recently visited London
  - 58 cases
  - Borough Park and Williamsburg neighborhoods in Brooklyn

*As of 12-19-2018
Current Outbreak

• Complications
  • Respiratory distress, pneumonia, dehydration, otitis media
  • At least 6 hospitalizations to date
    • 3 adults and 3 children
    • One child required care in the PICU
  • No known cases of encephalitis
# Current Outbreak: Vaccination Status

<table>
<thead>
<tr>
<th>Age Group</th>
<th># Cases</th>
<th>0 Doses</th>
<th>1 Dose</th>
<th>2 Doses</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 Year</td>
<td>15</td>
<td>15 (100%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-3 Years</td>
<td>21</td>
<td>20 (95%)</td>
<td>1 (5%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4-18 Years</td>
<td>47</td>
<td>42 (89%)</td>
<td>0</td>
<td>2 (4%)</td>
<td>3 (6%)</td>
</tr>
<tr>
<td>19 + Years</td>
<td>19</td>
<td>8 (42%)</td>
<td>1 (5%)</td>
<td>1 (5%)</td>
<td>9 (47%)</td>
</tr>
<tr>
<td>Totals</td>
<td>102</td>
<td>85 (83%)</td>
<td>2 (2%)</td>
<td>3 (3%)</td>
<td>12 (12%)</td>
</tr>
</tbody>
</table>
Public Health Response: Vaccination

- Over 8,000 MMR vaccines have been administered since 10/1/2018
- Vaccinations being provided by healthcare providers, the local health department, community PODS
- Most vaccinations have been administered by local healthcare providers

<table>
<thead>
<tr>
<th>Vaccination Date by First Day of the Week</th>
<th>Age at Immunization (years)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 1</td>
<td>1-4</td>
</tr>
<tr>
<td>10/1/2018*</td>
<td>5</td>
<td>188</td>
</tr>
<tr>
<td>10/8/2018</td>
<td>7</td>
<td>287</td>
</tr>
<tr>
<td>10/15/2018</td>
<td>131</td>
<td>1544</td>
</tr>
<tr>
<td>10/22/2018</td>
<td>162</td>
<td>1210</td>
</tr>
<tr>
<td>10/29/2018</td>
<td>212</td>
<td>1392</td>
</tr>
<tr>
<td>11/5/2018</td>
<td>165</td>
<td>969</td>
</tr>
<tr>
<td>11/12/2018</td>
<td>61</td>
<td>352</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>743</strong></td>
<td><strong>5942</strong></td>
</tr>
</tbody>
</table>

*Only looking at vaccines administered since Oct. 3rd
## MMR Rates for 1 - 18 Year Old in Rockland County by Zip Code (valid doses only)

<table>
<thead>
<tr>
<th>Zip Code</th>
<th>Age Group</th>
<th>Population*</th>
<th>Complete** by 12/13/2018</th>
<th>Rate as of 12/13/2018</th>
<th>Rate as of 10/1/2018</th>
<th>Difference in Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>10952</td>
<td>1-3</td>
<td>5033</td>
<td>3811</td>
<td>75.7%</td>
<td>54.2%</td>
<td>21.5%</td>
</tr>
<tr>
<td></td>
<td>4-18</td>
<td>20154</td>
<td>13578</td>
<td>67.4%</td>
<td>63.0%</td>
<td>4.4%</td>
</tr>
<tr>
<td>10956</td>
<td>1-3</td>
<td>941</td>
<td>747</td>
<td>79.4%</td>
<td>72.2%</td>
<td>7.2%</td>
</tr>
<tr>
<td></td>
<td>4-18</td>
<td>6452</td>
<td>4997</td>
<td>77.4%</td>
<td>76.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>10977</td>
<td>1-3</td>
<td>5844</td>
<td>4659</td>
<td>79.7%</td>
<td>63.7%</td>
<td>6.0%</td>
</tr>
<tr>
<td></td>
<td>4-18</td>
<td>26671</td>
<td>19450</td>
<td>72.9%</td>
<td>69.9%</td>
<td>3.0%</td>
</tr>
</tbody>
</table>

*Population includes all 1 - 18 year old as of 11/20/2018 in NYSIIS who have at least one immunization (or a birth certificate)

**Complete for 1 - 3 year old = 1 Dose of MMR, Complete for 4 - 18 year old = 2 Doses MMR
Public Health Response

• Community Outreach:
  • Door hangers
  • Posters
  • PSAs
  • Postings in local journals
  • Provider visits
  • School visits
  • Meetings with school principals
  • Conference call with moms
  • School exclusions

Measles is spreading in our community.
It can be dangerous to anyone who is not vaccinated.
Protect yourself and your family.
Talk to your health care provider.

Questions about measles or the vaccine?
Call 888-364-4837
Monday-Friday, 9 am-5 pm
health.ny.gov/measles
Public Health Response

- Health Care Provider and School Support:
  - Advisories
  - Clinical support
  - Epi X
  - Letters to providers
  - Fact sheets
  - Letters to school administrators
  - School exclusion algorithm
The provider’s role in outbreak control
Provider Roles

- Identify suspect cases and report to local health department (LHD)
- Work with LHD to conduct testing to confirm cases
- Implement infection control practices to prevent further transmission
- Ensure staff are immune
- Provide post-exposure prophylaxis for case contacts
- Provide primary community prevention through MMR vaccination
- Assist in patient and community education
Suspect Case Identification and Reporting

• Early recognition, case investigation, and prompt public health response can limit the spread of disease

• Clinical Suspicion:
  • Know the presentations
  • This includes classical and atypical presentations

• Patient History:
  • Vaccination record
  • Travel history (during incubation period)
  • Contact with international traveler
  • Contact with person with similar symptoms
Suspect Case Identification: Conjunctivitis and Coryza

Source: Centers for Disease Control and Prevention
Suspect Case Identification and Reporting

Koplik Spots
- Pathognomonic for measles

Source: Centers for Disease Control and Prevention
Vaccine Rash

- Fever and rash may occur 6 to 12 days after vaccination
- NYS Wadsworth Lab can test to differentiate vaccine strain virus from wild-type virus

Source: NYSDOH Bureau of Immunization.
Differential Diagnosis of Measles

• Other febrile rash illnesses:
  • Parvovirus B19 (Fifth’s Disease)
  • Human Herpesvirus – 6 (Roseola)
  • Enteroviruses
  • Streptococcal infection (Scarlet Fever)
  • Adenovirus
  • Infectious mononucleosis
  • Influenza: “Fleasles”
  • Dengue
  • Drug rash

• If you have a patient presenting with a febrile rash illness, consider the patient presentation and differential carefully. If measles is a concern, enact infection control practices immediately, and immediately report the case to your local health department.

• **DO NOT WAIT FOR LABORATORY CONFIRMATION TO REPORT**
Current Guidance
Reporting Requirements

Reporting of suspected and confirmed communicable diseases by providers is mandated under the NYS Sanitary Code

Who must report?
- Physicians
- Nurses
- Laboratory Directors
- Infection Control practitioners
- Healthcare facilities
- State institutions
- Schools

Call the LHD upon suspicion immediately – do not wait to call

Testing

Testing algorithm available:
• Flow Chart
• Narrative format

Clinical Case Definition
• A generalized maculopapular rash and
• Temperature ≥ to 101°F (38.8°C) and
• Cough, conjunctivitis, or coryza

Outbreak region: As defined by public health, as of 10/31/18, includes New Square, Monsey, Spring Valley, New City. This outbreak region may be modified as the outbreak progresses, and new areas are identified.
Testing

Measles Testing Recommended:
For individuals with fever and maculopapular rash:
• Who have received a measles-containing vaccine prior to rash onset
• With an atypical presentation and **either** live, work, attend school, or shop in the outbreak region* (epi-link to the outbreak region) **or** have known contact with a person diagnosed with measles by a healthcare provider (HCP) (epi-link to an individual)
• With international travel within 21 days of developing symptoms
• If you suspect measles and the individual has no epi-link to the outbreak region* and **no** epi-link to an individual diagnosed with measles by a HCP
  o Healthcare provider should consider other causes of generalized rash and fever and test as appropriate, particularly when symptom onset and progression are not classic for measles (Roseola, Fifth Disease, Strep throat, etc.)
Testing

Measles Testing Can Be Deferred:
For individuals who present with symptoms clinically compatible with measles as defined in the CCD (who were not previously vaccinated or did not have international travel in the last 21 days):

• If they live, work, attend school, shop, etc. in the measles outbreak region* in Rockland County, or
• If they have had known contact with a person diagnosed with measles by a healthcare provider (HCP)
Post Exposure Prophylaxis (PEP)

• For exposed individuals without evidence of immunity (priority includes pregnant women, infants <12 month and severely immunocompromised)
• May prevent or modify disease
• MMR vaccine or Immunoglobulin (IG), MMR and Ig cannot be given at the same time

• MMR vaccine
  • **Within 72 hours** of initial exposure
  • Persons age ≥ 6 months
  • Vaccination should be offered at any interval following exposure to protect from future exposures

• IG
  • **Within 6 days** of initial exposure
  • Individuals who are at risk for severe disease and complications from measles should receive IG, IV for pregnant women and severely immunosuppressed
  • IGIM can be given to other exposed persons without evidence of immunity
    • Priority for those with intense, prolonged contact
    • If vaccine is contraindicated
Infection Control Practices

• Healthcare settings
  • Implement appropriate infection control procedures for any suspected cases immediately
    • Have patient wear a medical mask
    • Healthcare providers wear an N95 mask
    • Airborne infection isolation room (negative pressure)
      • Alternate: Private room away from susceptible patients with door closed
      • Don’t use the room for two hours after the patient has been there
    • Always alert receiving facility prior to patient transfer so that appropriate infection control can be implemented

• Other settings
  • Isolate patient while infectious
    • Through 4 days after rash onset
Vaccine Recommendations for Outbreak

• **Written documentation** of adequate vaccination:
  
  • *Two doses* of measles-containing vaccine given on or after the first birthday and at least 28 days apart
  
  • For children 6-11 months of age, one dose of a measles-containing vaccine is recommended during this outbreak.
    • These children will need a second dose on or after the first birthday, and a third dose at least 28 days after the second.
School Exclusions

• Due to multiple exposures in schools and early childhood settings, and the growing nature of the outbreak, steps have been taken to require the exclusion of children from school.

• This includes children who:
  • have been exposed and are non-immune,
  • are non-immune and in schools in close geographic proximity to confirmed cases

• To date there are more than 30 schools, daycares, and nursery schools in Rockland county that have been required to enact exclusion policies to help stop the spread of measles as permitted by NYS Public Health Law.

• As cases continue to be identified, additional school exclusions of unvaccinated children may be required.
Pregnancy

- Pregnant women are at higher risk for complications of measles and for miscarriage or preterm labor.
- MMR cannot be given during pregnancy
- For post-exposure prophylaxis, pregnant women must be given IG via the IV route
- Pregnant women can be around someone who has received the MMR vaccine. Transmission of measles from the MMR vaccine has never been documented.
Questions?