MEASLES IN NYC

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New York City Department of Health & Mental Hygiene
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Measles – Clinical Manifestations

- Symptoms
  - High fever
  - Cough
  - Conjunctivitis
  - Coryza
  - Generalized rash

- Complications
  - Diarrhea, otitis media, pneumonia, miscarriage, preterm labor, encephalitis, and death
Transmission

- Highly contagious
  - 90% attack rate in close contacts
- Droplet and airborne transmission
  - The virus can stay in the air for up to 2 hours
- Incubation period (time from exposure to illness)
  - 7 to 21 days after exposure
- Infectious period
  - 4 days before through 4 days after rash onset, 9 days total

Preventing airborne transmission:
Use of a negative pressure/airborne isolation room
Treatment

- No specific antiviral therapy
- Medical care is supportive
- Vitamin A may be used for severe measles cases among children (e.g. hospitalized)*

* https://redbook.solutions.aap.org/
Measles — United States, 1950-2011

* Elimination defined as the absence of continuous disease transmission for >12 months in a specific geographic area

CDC. Pink Book: Epidemiology and Prevention of Vaccine-Preventable Diseases, 13th Ed.
Measles Vaccine

- Administered with mumps and rubella as MMR or with mumps, rubella and varicella as MMRV
- Live-attenuated vaccine
- Vaccine effectiveness: 1 dose ~93%, 2 doses ~97%
- Rash after MMR vaccination (5%)

Measles Vaccine: Routine Pediatric Recommendations

- Routine schedule
  - First dose age 12-15 months
  - Second dose age 4-6 years

- Daycare and school requirements in NY
  - One dose required for nursery (age ≥12 months) through pre-k
  - Two doses required for grades K through 12
  - Two doses required for college
Measles Vaccine: Routine Adult Recommendations

- One dose of MMR for adults with no or unknown evidence of immunity to measles
- Two doses of MMR for high risk groups
  - Healthcare personnel
  - International travelers
  - People exposed in an outbreak setting
  - People previously vaccinated with killed measles vaccine or unknown type of measles vaccine from 1963-1967
- Serologic testing (IgG) is an alternative
Measles Vaccine: Contraindications

- Very few contraindications or valid medical exemptions:
  - Infants < 6 months
  - Pregnancy
  - Severely immunocompromised
- Household members of pregnant or immunocompromised people CAN be vaccinated
- Non-immune women CAN be given MMR immediately post-partum
- Breastfeeding is NOT a contraindication
- There are no contraindications to simultaneous administration of any vaccines
<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madagascar</td>
<td>59388</td>
</tr>
<tr>
<td>Ukraine</td>
<td>40031</td>
</tr>
<tr>
<td>India</td>
<td>14304</td>
</tr>
<tr>
<td>Brazil</td>
<td>9198</td>
</tr>
<tr>
<td>Philippines</td>
<td>8212</td>
</tr>
<tr>
<td>Venezuela (Bolivarian Republic of)</td>
<td>5668</td>
</tr>
<tr>
<td>Thailand</td>
<td>4871</td>
</tr>
<tr>
<td>Pakistan</td>
<td>4775</td>
</tr>
<tr>
<td>Yemen</td>
<td>4057</td>
</tr>
<tr>
<td>Israel</td>
<td>3146</td>
</tr>
</tbody>
</table>
International Travel Recommendations

- Children aged 6 to 11 months should receive an early, extra dose of MMR prior to international travel
  - Does not count towards the routine schedule
  - Repeat at age 12 months (as long as 28 days have passed since the prior dose)
- Children and adults age 12 months and older should be up-to-date with MMR
- MMR should ideally be given at least 2 weeks prior to travel
MEASLES OUTBREAK

New York City, 2018-2019

New York City declares a public health emergency amid Brooklyn measles outbreak
BACKGROUND: 2018-2019 MEASLES OUTBREAK

• Large measles outbreaks in Israel
  – >4,100 cases from March 2018 through April 2019
  – Orthodox Jewish community
• Outbreak in NYC
  – Began in October 2018 with an unvaccinated child from Brooklyn who acquired measles in Israel
  – 588 cases, as of June 10, 2019
  – Largest U.S. outbreak since 1992*
  – Multiple importations from Israel, UK, Ukraine, Rockland County, NY and NJ

*CDC. Measles—United States, 1992. MMWR 1993
FOCUS IN ORTHODOX JEWISH NEIGHBORHOODS
WILLIAMSBURG AND BOROUGH PARK, BROOKLYN

Recent community transmission in Sunset Park (mostly non-Orthodox Jewish)
Measles Outbreak, NYC 2018-2019, by Rash Onset

*As of June 10, 2019  https://www1.nyc.gov/site/doh/health/health-topics/measles.page#vaxreq
Geographic Distribution of Cases

<table>
<thead>
<tr>
<th>Neighborhood</th>
<th>Total Cases</th>
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</thead>
<tbody>
<tr>
<td>Williamsburg, Brooklyn</td>
<td>437</td>
</tr>
<tr>
<td>Borough Park, Brooklyn</td>
<td>100</td>
</tr>
<tr>
<td>Sunset Park, Brooklyn</td>
<td>16</td>
</tr>
<tr>
<td>Willowbrook, Staten Island</td>
<td>6</td>
</tr>
<tr>
<td>Brighton Beach/Coney Island, Brooklyn</td>
<td>5</td>
</tr>
<tr>
<td>Midwood/Marine Park, Brooklyn</td>
<td>5</td>
</tr>
<tr>
<td>Crown Heights, Brooklyn</td>
<td>4</td>
</tr>
<tr>
<td>Flushing, Queens</td>
<td>3</td>
</tr>
<tr>
<td>Bensonhurst, Brooklyn</td>
<td>3</td>
</tr>
<tr>
<td>Jamaica, Queens</td>
<td>3</td>
</tr>
<tr>
<td>Port Richmond, Staten Island</td>
<td>2</td>
</tr>
<tr>
<td>Chelsea/Clinton, Manhattan</td>
<td>1</td>
</tr>
<tr>
<td>Far Rockaway, Queens</td>
<td>1</td>
</tr>
<tr>
<td>Hunts Point/Longwood/ Melrose, Bronx</td>
<td>1</td>
</tr>
<tr>
<td>Flatbush, Brooklyn</td>
<td>1</td>
</tr>
</tbody>
</table>

*As of June 10, 2019*
## Age Distribution of Cases

*As of June 10, 2019*

<table>
<thead>
<tr>
<th>Age Category</th>
<th># Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 year</td>
<td>91</td>
</tr>
<tr>
<td>1 to 4 years</td>
<td>252</td>
</tr>
<tr>
<td>5 to 17 years</td>
<td>125</td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>120</td>
</tr>
</tbody>
</table>
Vaccination Status of Cases

- # Unvaccinated: 429 (86%)*
  - Age <12 months: 89
  - Age ≥12 months: 340
- # Vaccinated: 69 (14%)*
  - 1 prior MMR: 42
  - 2 prior MMR: 27
- # Unknown Vaccination History: 90 (adults)

*% among cases with known vaccination status

*As of June 10, 2019
Complications

- Hospitalizations: 48
  - ICU admissions: 17
- Pneumonia: 27
- Otitis media: 60
- Diarrhea: 87
- No deaths have occurred

*As of June 10, 2019*
Sources of Infection

- Domestic & international importation
- Household members / relatives
- Shared residential buildings
- Neighbors / friends
- Daycares / yeshivas
- Healthcare-acquired
Exposures

- >18,500 exposed persons*
  - Mainly in medical facilities
- Factors associated with these exposures
  - Lack of negative pressure rooms
  - Exposures before rash onset
  - Inadequate isolation and delays in case reporting
- 20 cases acquired in healthcare facilities

*As of June 10, 2019
NEW YORK CITY DEPARTMENT OF HEALTH RESPONSE
Revised MMR Recommendations During Outbreak

• For persons residing or regularly spending time in areas with ongoing measles transmission
  – Williamsburg, Borough Park, Sunset Park, Crown Heights*

*Recommendations made 1/22 for Williamsburg/Borough Park and 5/24 for Sunset Park and 6/18 for Crown Heights

Please go to: www1.nyc.gov/site/doh/health/health-topics/measles.page for up to date information.
Revised MMR Recommendations During Outbreak: Children*

• Infants ages 6 to 11 months
  – Administer an early, extra dose of MMR
    ▪ Does not count toward 2-dose routine series
    ▪ Revaccinate at age 12 months**
  – Consider also for all Orthodox Jewish infants in NYC
• Children ages 1 to 4 years**
  – Early 2nd MMR

*For persons residing or regularly spending time in areas with ongoing measles transmission (Williamsburg, Borough Park, Sunset Park)

**Maintain 28 days between doses of live vaccines: MMR, varicella, intranasal flu
Revised MMR Recommendations During Outbreak: Adults*

- Two doses of MMR*
  - For adults with unknown vaccination history, serology (IgG) is an alternate option but vaccine preferred if feasible
  - An additional dose of MMR poses no risk and provides protection
  - Vaccine avoids time waiting for IgG results and possible need for a second visit
- Do not check IgG in persons with 2 documented, valid doses of MMR

*For persons residing or regularly spending time in areas with ongoing measles transmission (Williamsburg, Borough Park, Sunset Park)

**Maintain 28 days between doses of live vaccines: MMR, varicella, intranasal flu
School & Child Care Outreach

- DOHMH audits to ensure compliance with immunization requirements (n=101 facilities)
- Policy change in December to require exclusion of unvaccinated students with medical/religious exemptions in impacted zip codes
- Commissioner’s Orders and Notices of Violation to non-compliant facilities
- 10 schools closed for failing to provide access to medical and attendance records or for having students without the required documentation of MMR in attendance*

*As of June 10, 2019
Provider Outreach

- Multiple health alerts and presentations to clinicians
- Reminders to recall unvaccinated patients
- Clinical and infection control consultation
- Technical assistance to facilities/providers in affected communities
- Distribute posters and pamphlets in English and Yiddish to medical facilities
- Ensure providers have enough MMR vaccine on hand
- Assist with post-exposure prophylaxis for exposed persons
Community Outreach

- Print ads and social media specific to Orthodox community
- Press release, media interviews/articles
- Met with rabbinical and community leaders, elected officials
- Partner with Jewish Orthodox Women’s Medical Association and Vaccine Task Force on educational outreach
- Distribute 29,000 pro-vaccination booklets geared to Orthodox community
- Letters to parents through schools
- Multiple rounds of robocalls (30,000 households per round)
- 3,000+ letters sent to families with unvaccinated children in Williamsburg
- Telephone hotline
- Attended health fairs
April 9: Public Health Emergency Declared
Commissioner’s Order

- Every adult and child who lives, works or resides in Williamsburg (4 zips*) and has not received the MMR vaccine must be vaccinated
- Exemption: People who demonstrate they are immune from measles or should be medically exempt
- 123 individual summonses issued since 4/9/19
- $1,000 fine if summons is upheld

*Zips: 11205, 11206, 11211, 11249

As of May 29, 2019
Increases in Vaccination

- From April 9, 2019, when the emergency order was issued, to June 9, 2019, 51,124 MMR vaccinations (3,844 in Williamsburg) have been administered to children 6 months to 18 years of age in New York City

- This is an additional 14,130 vaccinations as compared to the same period last year – a 38% increase
INFECTION CONTROL AND POST-EXPOSURE PROPHYLAXIS
Steps for Providers/Facilities

- Screen patients for rash with fever at entry to your facility
- Report suspected cases to DOHMH
- Ensure isolation precautions are in place
- Collect specimens
- Determine if there were exposures
- Recommend post-exposure prophylaxis (PEP) and/or isolation as indicated

https://www1.nyc.gov/site/doh/providers/health-topics/measles.page
1. Screen patients for rash with fever at entry

- Consider measles if evaluating patients with fever and rash
- Critical to identify people who may be contagious with measles before they enter your facility
  - Post signage outside entrances instructing people with risk factors (rash with fever, international travel, or exposure to measles) to call before entering
  - Post signage in waiting rooms, check-in, exam rooms
  - Front desk staff screen for risk factors at check-in
  - Staff who schedule medical visits do screening by phone
  - Posting staff at main entrance to screen for risk factors (facilities with multiple cases)
Fever and Rash? Consider Measles
Measles cases continue to be identified in New York City. Measles is highly contagious. Please protect patients, visitors, and staff!

Keep an eye out for measles symptoms:

Suspect measles in patients with:
• High fever
• Generalized rash

Prodrome
• Mild to moderate fever
• Cough
• Coryza
• Conjunctivitis

Rash onset
• Fever spikes, often as high as 104° to 105° F
• Red maculopapular rash that may become confluent—typically starts at hairline, then face, and spreads rapidly down body
• Koplik’s spots (tiny blue/white spots on the bright red background of the buccal mucosa) may be present

Act immediately if you suspect measles:

• Implement airborne infection control precautions immediately, mask and isolate patient—negative pressure rooms if available.
• Permit only staff immune to measles to be near the patient.
• Do not use any regular exam room for at least 2 hours after a suspected measles patient has left the room.
• Contact Infection Control staff.
• Expedite measles serologic testing (IgM and IgG) and virus testing. Notify the Health Department to arrange testing at the Public Health Laboratory; use of commercial labs may delay the diagnosis.
• Safeguard other facilities: assure airborne infection control precautions before referring patients.
• If you’re a health care provider and need guidance or need to report a suspect measles case, call the Health Department Provider Access Line at 866-692-3641.

Call 311 or visit nyc.gov/health for more information.

Adapted with permissions from the California Department of Public Health, Immunization Branch.
2. Report to DOHMH

- Report at time of initial suspicion
- Do not wait for laboratory results to report
- DOHMH will provide guidance on specimen collection and will coordinate testing
- Report to NYC DOHMH: 347-396-2402 / 866-692-3641

3. Ensure Isolation Precautions

- Follow airborne precautions
  - Use negative pressure room
  - If not available, mask, private exam room, do not use room for 2 hours after (won’t eliminate exposures)
  - All healthcare staff entering the room should use an N95 respirator to prevent airborne transmission
- If patient will be sent home, home isolation for 4 days after rash onset
  - Avoid public transportation
  - Wear mask home

4. Collect Specimens

- Nasopharyngeal swab for measles PCR
  - Synthetic (Dacron or Copan) swab (not cotton)
  - Liquid viral transport media
  - Same as influenza PCR testing
- Serum for measles IgM and IgG
  - If IgM negative within 72h after rash onset, may need to repeat
- Testing at NYC DOHMH laboratory

5. Determine If There Were Exposures

- Compile exposure list through 2 hours after airborne isolation (or case left facility)
- Identify high-risk contacts (pregnant, immune compromised, infants)
- Determine if pregnant women are immune to measles (call OB for measles IgG records, check CIR, otherwise draw blood for stat testing)
- Notify exposed persons
6. RECOMMEND POST-EXPOSURE PROPHYLAXIS (PEP) AND/OR HOME ISOLATION, AS INDICATED

<table>
<thead>
<tr>
<th>Prophylaxis</th>
<th>Indications</th>
<th>Time from initial exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMR Vaccine</td>
<td>Non-immune persons ages ≥6 months</td>
<td>≤ 3 days</td>
</tr>
</tbody>
</table>
| Immunoglobulin (IG)   | • Infants (intramuscular)  
                        |   • Age <6 months  
                        |   • Age 6-11 months who don’t get MMR ≤ 3 days*  
                        |   • Severely immunocompromised regardless of measles immunity (intravenous)  
                        |   • Non-immune pregnant women (intravenous)                                  | ≤ 6 days                   |

*MMR preferred over IG for infants age 6-11 months when possible

6. PEP and/or Home Isolation, Continued

• Exposed people who are not immune to measles and who do not receive post-exposure prophylaxis must stay home through 21 days after last exposure.

• Because IG prolongs the incubation period, people who receive IG must stay home through 28 days after last exposure.

• Exposed people who are placed on home quarantine should be advised to call in advance if medical care is needed to avoid exposures.

• MMR PEP may be administered to exposed persons before laboratory confirmation of the index case.

Home quarantine instruction sheets: www1.nyc.gov/site/doh/providers/health-topics/measles.page
ADDRESSING CONCERNS ABOUT VACCINES
Addressing Vaccine Delays

- Delays in vaccination of children in NYC contributed to this outbreak
- Provider recommendation matters!
  - Strong provider recommendations for vaccination are the most important factor in convincing parents to vaccinate
  - “Today your child will be receiving [MMR] vaccine”
- Do not phrase as a question (similar to prescribing antibiotics, blood testing for lead)
- Be prepared to address parental concerns and questions, if asked
- Display empathy

CDC Provider Resources for Vaccine Conversations with Parents
Addressing Vaccine Delays: Does MMR Vaccine Cause Autism?

• No.

  • The Lancet retracted the paper
  • Wakefield found guilty of fraud and falsifying data, barred from practicing medicine

• Subsequent research confirmed vaccines do not cause autism
  • Compared hundreds of thousands of children who received MMR vaccine to hundreds of thousands who did not
  • Risk of autism same in both groups

• Conclusion: MMR vaccine does not cause autism
Addressing Vaccine Delays: Is Aluminum in Vaccines Unsafe?

- Aluminum: An adjuvant that improves vaccine potency
  - Most common metal in our earth’s crust
  - Naturally present in water, soil, air
  - Present in fruits, vegetables, nuts, and flour
- Compare: Aluminum exposures during infancy (by age 6 months)
  - 4 to 6 mg from vaccines
  - 10 mg on breast milk; 40 mg on formula; 120 mg on soy

Ref: Vaccine Education Center at Children’s Hospital of Philadelphia
Addressing Vaccine Delays: Can so many Vaccines in Early Life Harm Children?

• No.

• Safety testing: Before vaccines are added to vaccine schedules, they are tested alone or with existing vaccines to ensure safety and effectiveness.

• Number of vaccines over time: While the number of vaccines has grown, children are exposed to fewer immunological components.
  • A century ago, children got just one small pox vaccine with ~200 immunological components.
  • Today, children typically receive 14 vaccines that together contain ~150 immunological components.

• A scraped knee is probably a greater immunological challenge than all of the childhood vaccines combined. The challenge that vaccines present is tiny compared to what is in the environment.

Ref: Vaccine Education Center at Children’s Hospital of Philadelphia (Vaccines and Autism and Too Many Vaccines)
Addressing Vaccine Delays: What is Harm of Delaying, Separating, or Spacing out Vaccines?

• Delaying vaccines increases the amount of time your child is at risk for severe and sometimes deadly infections.

Ref: Vaccine Education Center at Children’s Hospital of Philadelphia (Too Many Vaccines: What you should know):
Addressing Vaccine Delays: But my Child is Sick Today...

- Mild illness (even with fever) is NOT a contraindication to vaccination
- Being on antibiotics is NOT a contraindication to vaccination
- Safety and efficacy of vaccinating people with mild illness is documented
- Do not miss an opportunity to vaccinate
Addressing Vaccine Delays:  
But my Child Has an Egg Allergy...  

- Egg allergy is not a contraindication to MMR
Increasing on-time vaccination is critical to ending the measles outbreak!
THANK YOU