SURVEILLANCE, REPORTING AND CONTROL OF VACCINE-PREVENTABLE DISEASES:
WORKING TOGETHER TO CONTROL THE SPREAD

Adult Immunization Conference
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We, Nancy Harrington and Marija PopStefanija, have been asked to disclose any significant relationships with commercial entities that are either providing financial support for this program or whose products or services are mentioned during our presentations.

We have no relationships to disclose.

We will discuss the use of vaccines in a manner not approved by the U.S. Food and Drug Administration.

But in accordance with ACIP recommendations.
Today’s Topics

Vaccine-preventable Disease (VPD) Epidemiology in Massachusetts

- The 10-Year Table
- Collaboration
- Scenarios 1-4
  - Influenza
  - Pertussis
  - Mumps
  - Hepatitis B

Flu season is breaking records, CDC says

Smith College student contracted same meningitis strain as 2017 UMass outbreak

Puzzling mumps outbreak strikes Latino community
<table>
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<td>27</td>
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<tr>
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<td>770</td>
<td>606</td>
<td>628</td>
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<td>469</td>
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Data are current as of 3/6/2018 and are subject to change.

*Both confirmed and probable cases are reported for measles, mumps, rubella, and varicella to better reflect the true burden of disease. All other diseases include confirmed cases only.
# Vaccine-Preventable Disease Confirmed Cases vs. Investigations

Massachusetts*, 2008-2017

<table>
<thead>
<tr>
<th>Disease</th>
<th>Investigated</th>
<th>Confirmed*</th>
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</thead>
<tbody>
<tr>
<td>Measles</td>
<td>732</td>
<td>41</td>
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<tr>
<td>Mumps</td>
<td>2552</td>
<td>572</td>
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<tr>
<td>Rubella</td>
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<tr>
<td>Meningococcal Disease</td>
<td>540</td>
<td>120</td>
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<tr>
<td>Pertussis</td>
<td>5130</td>
<td>3823</td>
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<tr>
<td>Hib &lt; 5</td>
<td>1488 (HI of any age)</td>
<td>11</td>
</tr>
<tr>
<td>Tetanus</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td>Polio</td>
<td>180</td>
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</tbody>
</table>

Data are current as of 3/6/2018 and are subject to change.

*Both confirmed and probable cases are reported for measles, mumps, rubella to better reflect the true burden of disease. All other diseases include confirmed cases only.
Healthcare Provider Role

- Vaccinate! Get vaccinated!
- Report suspected and confirmed cases of VPDs!
- Notify patient of diagnosis/suspected diagnosis
- Provide key information to the LBOH to complete the official “Case Report” per 105 CMR 300.000

Control measures:
- Isolate patient if still infectious
- Educate patient about protecting their family and close contacts – Inform patient that the LBOH may be calling
- Assist with notification and PEP
- Exclude susceptible staff?
It is the end of flu season. An unvaccinated 20-something patient (who works in a long-term care facility) has arrived at your office carrying a letter from her employer recommending that she consider a prophylactic course of Tamiflu because there have been recent flu cases in the long-term care facility. The patient is also slated to attend a wedding in two days.

1. Could this scenario actually occur? Yes, it is consistent with MDPH recommendations.

2. Where are MDPH flu recommendations and resources located? Mass.gov/flu.

3. Should flu vaccine still be recommended to the patient late in the season? Yes!

4. Bonus points: If the patient has fever and cough during flu season, but tests negative for flu using a rapid assay in your office, could she still have the flu? Yes! Because of sub-optimal test sensitivity, false negative results are common, especially when influenza activity is high (CDC).
Influenza Season 2017 - 2018

• Severe season
• A lot of media attention
• Started building early but did not peak early (mid-February)
• Influenza A/H3N2 predominated (more flu B later in season)
• A/H3N2 tends to impact older adults disproportionately
• Record year for hospitalizations nationally
• Resources taxed and stressed (hospital beds, EDs, provider offices, vaccines, antivirals, IV bags, rapid tests)
Influenza Season 2017 - 2018

- Moderate to low vaccine effectiveness based on interim estimates:
  - 36% overall
  - 25% against H3N2
    - 51% against H3N2 among children 6 months – 8 years old
  - 67% against H1N1
  - 42% against B strains
- Better performance than initially expected
A 20-something patient wakes up with swelling under her jaw. She is a student at a local college where there have been cases of mumps. She had flu-like illness for a couple of days before the onset of swelling. She has plans to attend a wedding in two days.

Should your patient attend this wedding?
- She has two documented doses of MMR.
- She has not recently traveled out of the country.
- She promises to keep a low profile at the event.

1. Should she attend the wedding? No. Not unless another cause of the parotitis is found.

2. What testing can be done? PCR at MA SPHL. IgM serology also a possibility. Consider testing for other causes of parotitis.

3. Will the mumps test results influence isolation requirements? No. Patient should remain isolated even with a negative PCR result.

4. Should she get a third dose of MMR? In consultation with Public Health, if she is part of an ongoing outbreak, a 3rd dose may be recommended. – New!
2016

Largest mumps outbreak in MA in 30+ years
- 787 total investigations
- 258 confirmed and probable cases
- 80% associated with colleges/universities
- Part of a national trend

2017

- 713 total investigations
- 191 confirmed and probable cases
- 131/191 (69%) associated with outbreaks
  - 90/191 (47%) identified among members of Latino communities in Greater Boston. Smaller clusters included students who traveled to DC area (8); college students on North Shore (4); college students attending a party (5) and athletes at a MA college/university (24)

Transmission interrupted due to:
- Enforcement of existing school requirements for immunization
- Implementation of control measures, including isolation of suspected cases, quarantine of susceptible contacts and social distancing
- End of school year and school vacations
Mumps in Massachusetts 2016 - 2017

2016: 258 cases*
2017: 191 cases*

*includes confirmed and probable to better reflect the burden of disease.

Adult Immunization Conference 2018
Challenges with Mumps Control

- Two doses of MMR approximately 88% effective (range 31-95%)
- Asymptomatic people may transmit mumps
- Resistance to isolation for five days, especially with negative test results. A negative mumps PCR does not rule out mumps infection due to specimen collection factors/intermittent shedding
- Cultures of socializing/sharing items/sustained close contact
- Lack of access to healthcare/trust of authorities/language barriers
- Lack of MMR vaccination in adults who are not US-born

On the bright side: college/university outbreaks with central organization and communication are extremely helpful with mumps prevention and control activities!
Persons previously vaccinated with 2 doses of a mumps virus–containing vaccine who are identified by public health authorities as being part of a group or population at increased risk for acquiring mumps in certain outbreak settings should receive a 3rd dose of a mumps virus–containing vaccine to improve an individual’s protection against an risk mumps disease and related complications.

**Factors to be considered:**
- Size of target population
- Mumps incidence/number of cases
- MMR3 vaccine coverage needed to impact the outbreak
- Timing of MMR3 vaccination
- Social networks
- Intensity and duration of close contact

Note: This is not a routine recommendation for a third dose, and it does not apply retroactively to past outbreaks!

Call MDPH Division of Epidemiology and Immunization at 617-983-6800 for consultation.
**Mumps in Massachusetts 2018**

As of 3/26/18*

- 158 investigations
  - 118 suspect
  - 28 revoked
  - 3 probable
  - 9 confirmed

- Of 12 confirmed/probable cases:
  - 10 in Boston or neighboring cities
  - Age range 15-53, median 24, mean 28
  - 8 females 4 males

*data are preliminary and subject to change
You have recently learned that a patient you evaluated has tested PCR positive for pertussis. The patient had classic pertussis symptoms including paroxysmal cough, with a cough onset two weeks before the evaluation. You are vaccinated with a dose of Tdap. You were not wearing a mask during the evaluation. Should you cancel your plans to attend a friend’s wedding?

1. Was the patient infectious during the evaluation? Yes.
2. Could you have been exposed? Yes.
3. Could you get pertussis? Yes. (Incubation period is 7 to 10 days, with a range of 4-21 days.)
5. Can you attend the wedding? Yes, if you do not have a cough.

Which groups are the priority targets of Public Health investigations and control measures for pertussis?

- Infants
- Pregnant women
- Immunocompromised people
- Healthcare workers
Confirmed Pertussis in MA 2000-2017
by Month of Onset

- Range: 7 to 441 cases per month
- Average: 63 cases
Confirmed Pertussis Cases in MA, 2008-2017

- <1 Year
- 1-6 Years
- 7-10 Years
- 11-19 Years
- 20+ Years

Number of Confirmed Cases

Year


Pertussis Cases by Age Group
Pertussis Incidence by Age Group

Pertussis Incidence in MA, 2008-2017

Cases per 100,000 population

Year

<1 year
1-6 years
7-10 years
11-19 years
20+ years
Acceptable Pertussis Diagnostic Tests

1. Culture at MA SPHL or any commercial lab
2. PCR from any commercial lab (*risk of false positives*)
3. Serology performed at MA SPHL
   - Must be drawn >3 years after a pertussis containing vaccine

<table>
<thead>
<tr>
<th>DURATION OF COUGH</th>
<th>CHILDREN (&lt;11 yrs)</th>
<th>ADULTS (≥ 11 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 14 DAYS</td>
<td>NP Swab(s) (for Culture &amp; PCR Testing)</td>
<td>NP Swab(s) (for Culture &amp; PCR Testing)</td>
</tr>
<tr>
<td>14-28 DAYS</td>
<td>NP Swab(s) (for Culture &amp; PCR Testing)</td>
<td>Serology at MA SPHL -OR- Serology at MA SPHL &amp; Consider NP Swab(s) (for Culture &amp; PCR Testing)</td>
</tr>
<tr>
<td>29-56 DAYS</td>
<td></td>
<td>Serology at MA SPHL</td>
</tr>
</tbody>
</table>

*Because of the possibility of false positive PCR results, and the need to avoid antibiotic overuse, and the need for caution when using isolation and quarantine regulations, MDPH only makes formal control measures when patients who are PCR-positive have symptoms which are consistent with the pertussis clinical case definition: ≥ 2 weeks of cough and either post-tussive vomiting, the whoop, paroxysmal cough, or apnea (infants <1).*
A 30-something patient presents with one week of fatigue, nausea, fever, and dark urine. She attended a wedding three months ago and had unprotected sex with another guest.

She’s since heard from mutual friends that this individual was diagnosed with hepatitis, which he was exposed to via injection drug use (IDU).

What type(s) of hepatitis might you be concerned about?

- **Hepatitis C**
  IDU is a risk for *hepatitis C infection*. However hepatitis C is not typically transmitted sexually.

- **Hepatitis A**
  There have been recent *hepatitis A* outbreaks associated with drug use and homelessness in California, Michigan, and Utah. However, the incubation period for hepatitis A is 2-6 weeks, so she would have had symptoms earlier.

- **Hepatitis B**
  Yes! People who inject drugs (PWID) are also at risk for *hepatitis B infection*, and hepatitis B is transmitted sexually. (Incubation period up to 6 months.)
Reported Number of Acute Hepatitis B Cases – United States, 2000-2015

National Notifiable Diseases Reporting System

Increase associated with concomitant rise in injection-drug use
Incidence of Acute Hepatitis B by Age Group – United States, 2000-2015

National Notifiable Diseases Reporting System
Surveillance for Viral Hepatitis – United States, 2015
(www.cdc.gov/hepatitis/statistics/2015surveillance)
Hepatitis B Outbreak in MA

• 2017: 78% increase in acute hepatitis B cases in **Bristol County**
• Geographic cluster within county with high rate of IDU
  - More males than females
  - Median age 38.5
  - Where known, mostly white non-Hispanic
  - Many diagnosed in emergency department
  - High rate of hospitalization
  - Many with lab evidence of hepatitis C exposure
• Vaccination efforts during March 2018 resulted in >50 doses being given during the first two weeks, and testing for HBV infection
Hepatitis B and IDU

- Several states have reported a recent increase in acute hepatitis B cases among PWID
- ACIP recommends that PWID are vaccinated against hepatitis A and hepatitis B
- CDC also recommends testing for hepatitis B and hepatitis C infection in anyone who has injected drugs
Persons Recommended to Receive Hepatitis B Vaccine – 20 Groups in Brief!

- All infants
- Unvaccinated children <19
- Persons at risk by sexual exposure
- Sex partners of hepatitis B surface antigen-positive persons
- Sexually active persons not in a long-term monogamous relationship
- Persons seeking evaluation or treatment for an STI
- Men who have sex with men
- Persons at risk for infection by percutaneous or mucosal exposure to blood
- Current or recent infection-drug users
- Household contact of HBsAg-positive persons
- Residents and staff of facilities for developmentally disabled persons
- Healthcare and public safety personnel with anticipated risk for blood exposure
- Hemodialysis patients
- Persons with diabetes aged 19-59 years (and ≥60 at discretion of provider)
- International travelers to countries with high or intermediate endemicity
- Persons with HCV infection
- Persons with chronic liver disease
- Persons with HIV infection
- Incarcerated persons
- All others seeking protection from HBV infection

Resource for Interpretation of Hepatitis B Serologic Test Results

<table>
<thead>
<tr>
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<th>HBsAg</th>
<th>anti-HBc</th>
<th>anti-HBs</th>
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</tr>
<tr>
<td>Immune due to natural infection</td>
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<td>negative</td>
</tr>
<tr>
<td>Immune due to hepatitis B vaccination</td>
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</tr>
<tr>
<td>Acutely infected</td>
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<tr>
<td>Chronically infected</td>
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<tr>
<td>Interpretation unclear; four possibilities:</td>
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<td>negative</td>
</tr>
<tr>
<td>1. Resolved infection (most common)</td>
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<tr>
<td>2. False-positive anti-HBc, thus susceptible</td>
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<tr>
<td>3. “Low level” chronic infection</td>
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</tr>
<tr>
<td>4. Resolving acute infection</td>
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Resources:

CDC’s Hepatitis B Facts for Health Professionals:
https://www.cdc.gov/hepatitis/hbv/hbvfaq.htm

Hepatitis B Vaccination, Screening, and Linkage to Care: Best Practice Advice From the American College of Physicians and the Centers for Disease Control and Prevention (Annals of Internal Medicine, 12/2017):

https://www.cdc.gov/mmwr/volumes/67/rr/pdfs/rr6701-H.PDF

CDC Viral Hepatitis Serology Training:
https://www.cdc.gov/hepatitis/resources/professionals/training/serology/training.htm

Chart available at: https://www.cdc.gov/hepatitis/hbv/pdfs/serologicchartv8.pdf
Questions?

Division of Epidemiology and Immunization, 24/7 telephone line: 617-983-6800.