FY19 Epi-Tech Surveillance Training

Friday, October 05, 2018 - Monday, September 30, 2019
DCS, APG, MD

Provided By
U.S. Army Medical Command

<table>
<thead>
<tr>
<th>Activity ID</th>
<th>Course Director</th>
<th>CME Planner</th>
</tr>
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<tbody>
<tr>
<td>2018-1656</td>
<td>John Ambrose</td>
<td>Mimi C. Eng</td>
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Accreditation Statement
This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of U.S. Army Medical Command and ARMY PUBLIC HEALTH CENTER. The U.S. Army Medical Command is accredited by the ACCME to provide continuing medical education for physicians.

Credit Designation
The U.S. Army Medical Command designates this Live Activity for a maximum of 5 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

This is a required handout. It must be disseminated to each learner prior to the start of the activity.
Statement of Need/Gap Analysis
The purpose of this CME activity is to address the identified gap(s):
1. Disease identification - verification of disease by established case definitions have been utilized by the local health departments, Centers for Disease Control and Prevention, World Health Organization, and the Department of Defense. With the every changing list of reportable medical events and new emerging infections, case definitions change rapidly. Army epidemiologist conduct verification studies that monitor the efficiency of reporting by local public health experts and have concluded that completeness percentages for reportable medical events range as low as 35% for select diseases.

2. Outbreak reporting - Recent evidence have demonstrated that outbreak reporting and communication between public health agencies is poor. In fact, the Army failed to report six outbreaks in the DRSi between June 2016 and September 2016.

3. Surveillance techniques - Surveillance of common communicable diseases continues to be a problem among local MTFs. In fact, cases of campylobacter were not investigated in 2015 for PACOM MTFS, while 2016 cases of salmonella were not investigated. Civilian public health agencies are required to conduct investigations into all reportable medical events. However, DoD facilities often do not take initiative to conduct this investigation.

Learning Objectives
1. Based on case presentation, enhance your ability to improve case finding and surveillance practices within your local MTF.

Target Audience / Scope of Practice
Target Audience: The intended audience for this educational activity includes preventive medicine physicians, community health nurses, public health nurses, and epidemiology technicians.

Scope of Practice: This activity will improve the performance of preventive medicine personnel who conduct surveillance activities in inpatient and outpatient settings.
Disclosure of Faculty/Committee Member Relationships

It is the policy of the U.S. Army Medical Command that all CME planning committee/faculty/authors disclose relationships with commercial entities upon invitation of participation. Disclosure documents are reviewed for potential conflicts of interest and, if identified, they are resolved prior to confirmation of participation.

### Faculty Members

- Clemmons, Nakia - No information to disclose.
- Gilmore, Jessica - No information to disclose.
- Graham-Glover, Bria - No information to disclose.
- Kebisek, Julianna - No information to disclose.
- Macdonald, Bob - No information to disclose.
- Ruiz, Stefani - No information to disclose.
- Russell, Jamaal - Employment/Salary: Abbvie (spouse)
- White, Duvel - No information to disclose.

### Committee Members

- Ambrose, John - No information to disclose.
- Brown, Jodi - No information to disclose.
- Eng, Mimi - No information to disclose.
- Gibson, Kelly - No information to disclose.
- Graham-Glover, Bria - No information to disclose.
- Holbrook, Victoria - No information to disclose.
- Kebisek, Julianna - No information to disclose.
- Riegodedios, Asha - No information to disclose.
- Rudiger, Courtney - No information to disclose.

**Acknowledgement of Commercial Support**

There is no commercial support associated with this educational activity.
Announcements

• All participants MUST register for the Monthly Disease Surveillance Trainings:
  – Log-on or request log-on ID/password: https://tiny.army.mil/r/zB8A/CME
  – Register at: https://tiny.army.mil/r/EQk1/EpiTechFY19

• Confirm attendance:
  – Enter your full name/location/email into the DCS chat box to the right or email your service hub
  – If you are attending as a group, please list all attendees
  – You will receive a confirmation email within 48 hours with your attendance record; if you do not receive this email, please contact your service hub

• Reminder:
  – Mute your phones by pressing the mute button or pressing *6
  – DO NOT press the “hold” button as the rest of the conference will hear the hold music

• Contact:
  – Communicate with your service hub to ensure you get information on future trainings and past recordings
Contact Information

• **Army:** APHC – Disease Epidemiology Division
  Aberdeen Proving Ground – MD
  COMM: (410) 436-7605  DSN: 584-7605
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• **Navy:** NMCPHC Preventive Medicine Programs and Policy Support Department
  COMM: (757) 953-0700; DSN: (312) 377-0700
  Email: usn.hampton-roads.navmcppubhlthcenpors.list.nmcphc-threatassess@mail.mil
  Contact your cognizant NEPMU

  NEPMU2:  COMM: (757) 950-6600; DSN: (312) 377-6600
  Email: usn.hampton-roads.navhospporsva.list.nepmu2norfolk- threatassess@mail.mil

  NEPMU5: COMM: (619) 556-7070; DSN (312) 526-7070
  Email: usn.san-diego.navenpvntmedufive.list.nepmu5-health-surveillance@mail.mil

  NEPMU6: COMM: (808) 471-0237; DSN: (315) 471-0237
  Email: usn.jbphh.navenpvntmedusixhi.list.nepmu6@mail.mil

  Email: NEPMU7@eu.navy.mil

• **Air Force:** Contact your MAJCOM PH or USAFSAM/PHR
  USAFSAM / PHR / Epidemiology Consult Service
  Wright-Patterson AFB, Ohio
  COMM: (937) 938-3207  DSN: 798-3207
  Email: usafsam.phrepiservic@us.af.mil
Measles: Current National Situation and Public Health Response

Tri-Service Epi Tech Surveillance Training, 25 June 2019

Nakia S. Clemmons, MPH
Measles Epidemiology Team, Division of Viral Diseases, CDC
Agenda

- Overview of measles infection
- National measles update
- Measles investigation and appropriate testing guidance
Measles

- Acute, febrile rash viral illness
- Transmitted by direct contact with infectious droplets or airborne spread
- Most contagious of the vaccine preventable diseases
  - $R_0 = 12-16$
  - Secondary attack rate in susceptible household contacts $\sim 90\%$
Measles Clinical Presentation

- Exposure Period
- Rash Onset
- Infectious Period
# Measles Complications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>8%</td>
</tr>
<tr>
<td>Otitis media</td>
<td>7 – 9%</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1 – 6%</td>
</tr>
<tr>
<td>Hospitalized</td>
<td>1 in 4 cases</td>
</tr>
<tr>
<td>Encephalitis</td>
<td>1 per 1,000 cases</td>
</tr>
<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</td>
</tr>
</tbody>
</table>

Complications are more common in children <5 years and adults.
A few words on SSPE...

- Rare, but fatal progressive neurologic disease
  - Higher incidence in children aged <2 years

- Onset 7 years after infection, but could present decades after

- Clinical symptoms
  - Initially mild, mental deterioration (memory loss, behavioral changes)
  - Progression to myoclonic seizures, motor disability, and eventually to a persistent vegetative state
  - Death typically occurs within 1-3 years of diagnosis
Epidemiology
Measles Case Classification

- Confirmed cases are reported to CDC through the
  - National Notifiable Diseases Surveillance System (NNDSS)
  - National Center for Immunization and Respiratory Diseases (NCIRD) by phone or email

- Mandatory that clinicians report to their local health department

- States notify CDC within 24 hours of confirming a case

- If you have a probable or confirmed case at your installation:
  - Contact your PM POC immediately
  - Report to DRSi within 24 hours

- If your installation is performing contact tracing
  - Report in DRSi outbreak module
Reported Measles Cases, United States, 1962–2019*

*2018 and 2019 data are preliminary and subject to change
†Elimination is defined as the absence of endemic measles transmission in a region for ≥ 12 months in the presence of a well-performing surveillance system
Measles Elimination in the U.S.

- **Elimination**: Interruption of year-round transmission
  - Does not imply zero incidence

- Vaccine coverage >90% for 2 doses of MMR

- **Strong public health response to each case**
  - Resource-intensive

- Epidemiology of measles during elimination characterized by
  - Importations from endemic areas
  - Limited spread among non-immune persons
Number and Incidence of Reported Measles Cases – U.S., 2001 – 2019* (N=3641)

*Source: National Notifiable Diseases Surveillance System (passive surveillance); 2018 and 2019 data as of June 24, 2019
Measles Incidence Rate per Million (12M period)

Top 10**

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ukraine</td>
<td>72408</td>
<td>1629.39</td>
</tr>
<tr>
<td>Madagascar</td>
<td>69720</td>
<td>2800.61</td>
</tr>
<tr>
<td>India</td>
<td>60641</td>
<td>45.8</td>
</tr>
<tr>
<td>Pakistan</td>
<td>28164</td>
<td>145.77</td>
</tr>
<tr>
<td>Philippines</td>
<td>19358</td>
<td>187.36</td>
</tr>
<tr>
<td>Yemen</td>
<td>10566</td>
<td>383.05</td>
</tr>
<tr>
<td>Brazil</td>
<td>10318</td>
<td>48.69</td>
</tr>
<tr>
<td>Nigeria</td>
<td>7481</td>
<td>40.22</td>
</tr>
<tr>
<td>Thailand</td>
<td>6213</td>
<td>90.22</td>
</tr>
<tr>
<td>DR Congo</td>
<td>5864</td>
<td>74.48</td>
</tr>
</tbody>
</table>
Measles Importations by WHO Region — U.S., 2001–2019*

- Imported case-patients reported travel to 77 different countries during their exposure periods

2001-2019, US residents responsible for 64% of all imported measles cases

*2018 and 2019 data are preliminary as of June 24, 2019
Measles Importations by State—U.S., 2001–2019*

*2018 and 2019 data are preliminary as of June 24, 2019
Number of Reported Measles Cases by month – U.S., 2018–2019* (N=1459)

*Source: National Notifiable Diseases Surveillance System (passive surveillance); 2018 and 2019 data as of June 24, 2019
Measles National Summary – January 1 – June 24, 2019

- 1,077 cases (28 states) from January 1 – June 24, 2019
  - 64 (6%) were internationally imported
    - Top three source countries are the Philippines (15 imports), Ukraine (9 imports), and Israel (9 imports)
  - 984 (94%) were U.S.-acquired

- Median age 6 years (range: 1 day to 72 years)

- 90% of all reported cases were unvaccinated or had an unknown vaccination status

- 94% of all reported cases are outbreak-related
  - 75% are related to outbreaks in NYC or NYS

- 9% Hospitalized

- Genotypes identified: D8 and B3

*2019 data as of June 24, 2019*
# Number and Vaccination Status of Measles Cases, by Age-Group – U.S., January–June 2019

<table>
<thead>
<tr>
<th>Age-Group</th>
<th>No. of cases</th>
<th>IR per million population</th>
<th>Vaccination Status of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unvaccinated</td>
</tr>
<tr>
<td>0-5 months</td>
<td>36</td>
<td>18.28</td>
<td>36 (100)</td>
</tr>
<tr>
<td>6-11 months</td>
<td>102</td>
<td>50.26</td>
<td>97 (95)</td>
</tr>
<tr>
<td>12-15 months</td>
<td>112</td>
<td>84.61</td>
<td>100 (89)</td>
</tr>
<tr>
<td>16 months-4 years</td>
<td>236</td>
<td>16.00</td>
<td>195 (83)</td>
</tr>
<tr>
<td>5-17 years</td>
<td>281</td>
<td>5.16</td>
<td>213 (76)</td>
</tr>
<tr>
<td>18-29 years</td>
<td>121</td>
<td>2.24</td>
<td>40 (33)</td>
</tr>
<tr>
<td>30-49 years</td>
<td>140</td>
<td>1.67</td>
<td>20 (14)</td>
</tr>
<tr>
<td>≥50 years</td>
<td>51</td>
<td>0.39</td>
<td>4 (10)</td>
</tr>
<tr>
<td>Overall</td>
<td>1077</td>
<td>3.23</td>
<td>731 (69)</td>
</tr>
</tbody>
</table>

*US residents only; 2019 data as of May 17, 2019*
The United States remains in elimination, although ongoing outbreaks in close-knit communities and increased global measles activity puts the U.S. at risk for losing status.

Of the >3600 cases reported from 2001 to June 2019, one-third of cases have occurred in the past 18 months.

U.S. residents traveling abroad account for two-thirds of measles cases directly imported into the U.S.

Almost 90% of cases reported since 2001 were either unvaccinated or had an unknown vaccination status.

- Unvaccinated infants remain the highest risk group.
Measles Case Investigation and Testing
Prioritize measles on your differential diagnosis of a febrile rash illness if your patient:

- Has not been vaccinated against measles
- Has traveled internationally, or has been exposed to someone who traveled internationally, within 21 days prior to the onset of their rash
- Is living in or visiting a community where there is a measles outbreak
If you suspect a case of measles you should:

- Mask and promptly isolate the patient in a room with the door closed
- Collect a throat or nasopharyngeal swab for molecular testing using real-time polymerase chain reaction (RT-PCR) and blood for serology (IgM)
- Call your installation public health department or infection control team
  - Provide instructions on where to send specimens for testing
  - Identify who was exposed and who might need post-exposure prophylaxis with either MMR vaccine or immunoglobulin
  - Prioritize persons who are at high risk for complications including:
    - Infants aged <1 year
    - Pregnant women
    - Persons with immunocompromising conditions

Measles Testing (Serology: IgM)

- Provides evidence of current or recent infection
- May be present starting at day 0 post rash onset
  - Peaks at day 7
  - Collect serum sample as soon as possible upon suspicion of measles
- **Cannot be used to distinguish recent vaccination from recent infection**
- Is considered confirmatory testing
- Negative results do not rule out a case
- Can be difficult to interpret without supporting epidemiological information
Measles Testing (Serology: IgG)

- Used to assess immunity to measles
- Useful for identifying persons who are at highest risk of disease who cannot be vaccinated such as those who are immunocompromised or pregnant
- Provides evidence of previous infection or vaccination
- Generally persists for a lifetime
- Unvaccinated, infected individuals generally do not produce detectable levels of IgG until ~5 days post rash onset
Measles Testing (Molecular Diagnostics: Reverse Transcription Real-Time PCR (RT-qPCR))

- Can be conducted on throat swabs, nasopharyngeal swabs or urine
- Provides evidence of current or recent measles infection or recent vaccination
- Virus detection most successful if specimen is collected 1-3 days post rash onset but detection may be possible up to 14 days post rash onset
- All PCR positive specimens should be sequenced to determine the genotype of wild-type virus
- Genetic analysis can confirm independent sources of infection if different genotypes or clearly distinct lineages of one genotype are detected
  - 2017 B3 – multiple importations with distinct lineages
- Negative results do not rule out a case
Importance of Molecular Surveillance & Viral Detection

- Molecular techniques are increasingly important for case confirmation in low incidence settings and when serologic results are difficult to interpret.
- Are the only means to confirm suspected vaccine reactions.
- Results from molecular testing must be analyzed with data from other laboratory tests and epidemiologic information.
What providers need to know for their patients

- Providers do not need to actively screen adult patients for measles immunity
  - high population immunity and low risk of disease among adults in non-outbreak areas in the U.S.
- Providers should make sure patients have measles protection before international travel
  - U.S. residents traveling internationally are at high risk for acquiring measles abroad
  - Importations into the U.S. can lead to transmission to susceptible persons, such as infants, and outbreaks
  - Providers should vaccinate if the patient’s measles immunity status is unknown - serologic testing is not recommended.
- There is no adult catch-up program for adults born before 1989, or otherwise
What providers need to know about vaccination during outbreaks

- Providers should consult with base public health/preventative medicine for the most up-to-date recommendations
  - This may include additional doses of MMR for your patients (similar to travel recommendations)
- In limited circumstances, health departments may recommend vaccination of infants 6 through 11 months of age with one dose of MMR vaccine
  - Outbreak is affecting infants aged <12 months
  - Outbreak demonstrates sustained, community-wide transmission
  - Benefit of early protection against measles during a period of increased transmission and exposure should be weighed against risk of decreased immune response following subsequent MMR doses in infants vaccinated at <12 months of age compared with infants vaccinated at ≥12 months of age
  - MMR dose given prior to 12 months of age does not count towards routine schedule
AF Public Health

- For investigation assistance, please utilize the Epidemiology Toolbox located on the Kx

**USAFSAM Investigative Recommendations:**

- Anthrax - Investigation Recommendations | Investigation Form
- Campylobacter - Investigation Recommendations | Investigation Form
- Cryptosporidiosis - Investigation Recommendations | Investigation Form
- E. coli STEC - Investigation Recommendations | Investigation Form
- Hepatitis A - Investigation Recommendations | Investigation Form
- Legionellosis - Investigation Recommendations | Investigation Form
- **Measles - Investigation Recommendations | Investigation Form**
- Meningococcal Disease - Investigation Recommendations | Investigation Form
- Mumps - Investigation Recommendations | Investigation Form
- Salmonellosis - Investigation Recommendations | Investigation Form
Summary

- Providers should prioritize measles on the differential diagnosis for any patient presenting with a febrile rash who is unvaccinated, recently traveled internationally, or may have been exposed to a measles case or outbreak.

- Providers do not need to actively screen their adult patients for measles immunity.
  - Most adults in the United States are at low risk for measles b/c of high population immunity.

- Providers should ensure patients traveling internationally be adequately vaccinated against measles.
  - This may mean additional doses of MMR for some patients.

- If providers suspect measles both viral and serum specimens should be collected for testing.

- Providers should consult with their base public health/preventative medicine during measles outbreaks to see if additional steps are needed to protect their community.
Thank you

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For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Importance of rapid discrimination of wildtype infections from vaccine reactions

- Public health response very different
- Measles vaccine virus-specific RT-qPCR can distinguish vaccine strains (vaccine reaction) from wild type strains (disease).
  - Only CDC and the APHL VPD-RCs offer this test so specimens should be sent to the local health department.
  - This test cannot be used to determine the genotype of wild-type strains.
  - ~3 hours to determine wild-type infection vs vaccine reaction
- Currently need to sequence an RTq-PCR positive specimen
  - Time consuming: 2 rounds of PCR, Sequencing
  - 24-48 hours
Who is bringing measles into the United States?

- U.S. residents traveling abroad are responsible for 64% of direct importations

*2018 and 2019 data are preliminary as of June 24, 2019*