Influenza in the DoD

USAFA School of Aerospace Medicine / Epidemiology Consult Services
Presented by: DoD Global, Laboratory-based, Influenza Surveillance Program
Lt Col Federinko, MD, MPH, Laurie DeMarcus, MPH, Jeffrey Thervil, MPH
DSN: 798-3196 (Comm: (937) 938-3196)
Influenza Outline

I. About Influenza
   I. Clinical Information
   II. Subtypes and Strains
   III. Immunity-related Changes: Antigenic Drift/Shift
   IV. Vaccine

II. Influenza Surveillance in Military Populations
   I. Reportable Medical Event Case Definition
   II. Influenza-like Illness (ESSENCE)
   III. Surveillance Activities by Service

III. Contact Information
Clinical Information

• An acute viral disease of the respiratory tract
  – Fever, cough, sore throat, runny nose, headache, fatigue, body aches
• Spread by droplets or touching contaminated surfaces
• Incubation period is 1-4 days (2 days on average)
• Contagious 1 day prior, and up to 5-7 days after symptom onset (longer for children & immunocompromised)
• Severity depends on flu virus, vaccination status, and health status
• Recovery: few days to two weeks (1 week on average)
Subtypes and Strains

• Influenza A
  – Evolves rapidly & responsible for most epidemics and pandemics
  – Subtypes:
    • Divided into subtypes based on two surface proteins:
      – Hemagglutinin (HA)
      – Neuraminidase (NA)
    • Combine to create a single subtype (Example: H5N1, H1N1)
    • Are further divided into strains
  – Found in many different animals
• Influenza B
  – Gradually changing virus
  – Classified by strains based on their lineage:
    currently Yamagata or Victoria
  – Found primarily in humans
  – May cause epidemics, but not pandemics
Antigenic Drift

• Immunity-related changes to influenza A virus

  – Changes to regions of the HA surface protein can affect human antibody responses to the virus

• Antigenic Drift

  – Small gradual changes that occur over time and create a new strain that may not be recognized by immune system

    • Reason that new influenza vaccine is manufactured and distributed each year

  – USAFSAM conducts molecular sequence analysis on influenza specimens to monitor these changes
Antigenic Shift

• **Antigenic Shift**
  – Abrupt major change that produces a novel (not seen previously in humans) influenza A virus, for example pandemic H1N1
  – Result of direct animal-to-human transmission or mixing of human and animal viral genes within the same individual (reassortment)
  – Most people have little or no protection against the new virus

• **Example: 2009 influenza A(H1N1)pdm**
**Vaccine**

- **Get Vaccinated Early**
  - Flu seasons can be unpredictable and begin as early as October
  - Takes about 2 weeks for antibody production after vaccination
  - Influenza vaccine cannot give you influenza
    - The virus injected is inactivated (killed) or is attenuated (weakened)
    - Designed to only cause mild infection at cooler temperatures (not in the lungs)
- **This year, DoD ordered 3.8 M doses of trivalent (injection) and quadrivalent (injection & mist) vaccines for service members and beneficiaries**
  - Trivalent: A(H3N2), A(H1N1)pdm09, B/Yamagata
  - Quadrivalent: A(H3N2), A(H1N1)pdm09, B/Yamagata, B/Victoria
- **For the 2013-2014 influenza season, CDC estimated that among vaccinated individuals, about 60% fewer influenza cases occurred than would have if they had not been vaccinated.**
DoD Influenza Vaccination Policy

• DoD Policy
  • Service specific guidance:
    – Navy: BUMED msg Aug 2014
    – Army: OPORD 14-85
  – HA Policy 08-005: Policy for Mandatory Seasonal Influenza Immunization for Civilian Health Care Personnel Who Provide Direct Patient Care in DoD Military Treatment Facilities
Testing for Influenza

• **Rapid Diagnostic Tests**
  – Fast & easy but....
    • High specificity (correctly identifies negatives)
    • Low sensitivity (does not pick up positives very well)
    • Accuracy depends on the prevalence of circulating viruses

• **Confirmatory Tests**
  – Much more sensitive & specific
  – Common
    • RT-PCR detection (24-48 hours)
    • Tissue cell culture (up to 10 days for negative result)
  – Others
    • Immunofluorescent antibody staining (IFA) antigen detection
    • Hemagglutination inhibition (HI) 4-fold rise in antibody titer in paired acute and convalescent sera
    • Immunohistochemical (IHC) staining antigen detection (autopsy)
Influenza Surveillance

- Surveillance in military populations
- Varied approaches
  - Reportable Medical Events (RME)
  - Syndromic
  - Sentinel - AF
  - Shipboard, Recruit, & Population - Navy
  - Population - Army
Influenza and Military Populations

• Even with modern medical advances, influenza and influenza-like illness can cause high morbidity rates, undermining readiness

• Military members and their families:
  • Are stationed where new strains are likely to appear
  • Are highly mobile across the globe and could quickly spread a pandemic strain
  • May live in areas that represent "gaps" in the World Health Organization (WHO)/Centers for Disease Control and Prevention (CDC) influenza surveillance network

• Training environments are well suited for the spread of emerging respiratory pathogens

• Highly immunized military plus electronic vaccination data registry facilitate rapid assessment of vaccine protection against emerging strains
Reportable Medical Events (RMEs)

• “A reportable event may represent an inherent, significant threat to public health and military operation. These events have the potential to affect large numbers of people, to be widely transmitted within a population, to have severe/life threatening clinical manifestations, and to disrupt military training and deployment. Timely accurate reporting of probable, suspected or confirmed cases ensures proper identification, treatment, control, and follow-up of cases”
  – AFI 48-105, DA PAM 40-11 & AR 40-50, BUMEDINST 6220.12C

• DRSi
  – Web-based application
  – Identify, collect, document, manage, and track information on RMEs
  – Completeness/timeliness of data is user-driven
## Reportable Medical Events (RMEs)

### Influenza-associated Hospitalization

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included population</td>
<td>&lt; 65 years of age</td>
</tr>
<tr>
<td></td>
<td>Any beneficiary type/mandate status</td>
</tr>
<tr>
<td>Patient status</td>
<td>Influenza-associated hospitalization</td>
</tr>
<tr>
<td></td>
<td>Fever ≥ 100.5°F with cough or sore throat in absence of other diagnosis</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Positive rapid or confirmatory test</td>
</tr>
<tr>
<td></td>
<td>&lt; 4 days after hospital admission</td>
</tr>
</tbody>
</table>

### Case Classification

<table>
<thead>
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<th>Case Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmed</td>
<td>Meet criteria with confirmatory lab test (RT-PCR, culture, IFA, IHC, HI titer)</td>
</tr>
<tr>
<td>Probable</td>
<td>Meet case definition with positive rapid antigen test</td>
</tr>
</tbody>
</table>

### Notes

For all confirmed cases, a nasal wash specimen should be submitted to an appropriate lab for further influenza lab testing (i.e. sequencing)
# Reportable Medical Events (RMEs)

## Navy Required Reportable - Novel (and variant) Influenza

**Reference:** NMCPHC-TM-6220.12

<table>
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<td><strong>Included population</strong></td>
<td>Any beneficiary type/mandate status</td>
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</table>
| **Patient status** | Fever ≥ 100.5˚F with cough or sore throat in absence of other diagnosis  
Epi-linked (contact of a known case during which transmission was plausible) |
| **Laboratory** | Influenza A found to be a different subtype from currently circulating H1 and H3 viruses  
Using detection methods only available at state or military public health labs (like RT-PCR)  
Confirmed by CDC or by CDC/FDA approved protocols |

## Case Classification

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<td><strong>Confirmed</strong></td>
<td>Meet criteria with confirmatory lab test (CDC/FDA approved methods)</td>
</tr>
<tr>
<td><strong>Probable</strong></td>
<td>Meet case definition and is epi-linked without lab confirmation (i.e., no lab testing performed or inconclusive lab results)</td>
</tr>
<tr>
<td><strong>Suspect</strong></td>
<td>Meet case definition with pending lab confirmation</td>
</tr>
</tbody>
</table>
ILI Syndromic Surveillance

- Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE)
  - Designed by Johns Hopkins University Applied Physics Laboratory and DoD
  - Internet-based syndromic disease surveillance system
  - Used by DoD and some civilian health departments
- Useful in tracking an outbreak, monitoring the outbreak’s impact on medical resources, and monitoring success of mitigation measures.
ILI Syndromic Surveillance

- **ILI**
  - ICD codes include:
    - General respiratory diagnosis codes
    - Influenza specific ICD codes
  - CPT code
    - Infectious Agents
  - Chief Complaint
    - Influenza, fever and cough, or sore throat

- For more information on ESSENCE, please refer to [https://gumbo2.area52.afnoapps.usaf.mil/epi-consult/training/index.cfm](https://gumbo2.area52.afnoapps.usaf.mil/epi-consult/training/index.cfm)
DoD Global, Lab-based, Influenza Surveillance Program

- AF Influenza Program “Project Gargle”: 1976-1997
- National Science and Technology Council Presidential Decision Directive (NSTC PDD-7)
  - U.S. not prepared for threat posed by emerging infectious diseases
  - Action taken and AF was assigned lead executive agent for DoD influenza surveillance
- DoD Global, Lab-based Influenza Surveillance Program: 1998 – present
  - Sentinel-based, across services
    - Selected according to mission, location, gap in international surveillance
  - Collect 6-10 specimens/week meeting ILI case definition
  - Complete patient information on influenza surveillance questionnaire
  - Submit specimens and questionnaires to the USAFSAM lab
DoD Global, Lab-based, Influenza Surveillance Program

- USAFSAM provides collection kits to sentinel and participating sites

- Nasal wash collection kit
  - Questionnaire
  - Syringe
  - Collection cup
  - VTM vial
  - Biohazard bag
  - Bib
DoD Global, Lab-based, Influenza Surveillance Program

Sentinel Surveillance Sites 2014-2015

**CONUS Sites: 55**
- Air Force: 33
- Army: 11
- Navy & Marine Corps: 7
- Coast Guard: 6
- JTF CAPMED/DHA: 2

**OCONUS Sites: 36**
- Air Force: 18
- Army: 9
- Navy & Marine Corps: 7
- Coast Guard: 2
DoD Global, Lab-based, Influenza Surveillance Program

- Prevent Influenza Infections
- Reduce Morbidity & Mortality
- Force Health Protection

- Identify current strains & outbreaks
- Analyze vaccine effectiveness
- Track genetic changes of viruses in circulation (molecular sequence analysis)
- Detect and monitor antiviral resistance
- Contribute to annual vaccine selection
- Monitor severity trends
Surveillance Process and Vaccine Development

- Sentinel Sites
- Participating Non-Sentinel Sites
  - National Respiratory & Enteric Virus Surveillance System Labs (U.S.)
  - WHO Influenza Labs

USAFSAM DoD Global Lab-Based Sentinel Surveillance

*FDA’s VRBPAC* meets to decide strains for annual flu vaccine

CDC/Viral Surveillance

DoD System

Civilian System

*Food and Drug Administration, Vaccines and Related Biological Products Advisory Committee*
DoD Global, Lab-based, Influenza Surveillance Program

https://gumbo2.area52.afnoapps.usaf.mil/epi-consult/influenza
https://kx2.afms.mil/kj/kx7/Influenza/Pages/home.aspx

- Site-specific surveillance dashboard
  - Submission data
  - POC information
  - Shipping/storage

- Welcome packet
- Weekly reports
- Other sentinel site resources
- Novel virus information
- Historical data
- Program publications

Note: If you would like to receive these reports by email, send a request via email to the program at: usafsam.phrflu@us.af.mil
Influenza Dashboard

- Online dashboard that displays base-level information
  - Submission data
  - POC information
  - Shipping & storage information

https://gumbo2.area52.afnoapps.usaf.mil/epi-consult/influenza/dashboard/
Navy Influenza Surveillance Activities

• Shipboard and Recruit ILI surveillance
  – Fleet Disease and Injury Surveillance (D&I)
  – Naval Health Research Center (NHRC) FRI program
• Participate in USAFSAM sentinel surveillance program
• NMCPHC Epi Data Center Influenza SITREPs
• NMCPHC Influenza Advisory
  – Guide to tracking pneumonia in ESSENCE
Navy Influenza Surveillance Activities

• Fleet D&I surveillance (formerly known as DNBI)
  – Shift from weekly reporting of xls reports to electronic D&I tracking of AHLTA-T/SAMS encounters
    • Develop D&I report, including Fever and Respiratory categories
    • Track electronic encounters by ship to ensure complete capture
  – Units who wish to continue to report via xls spreadsheet - templates and reporting guidance can be found at: website http://www.med.navy.mil/sites/nmcphc/program-and-policy-support/disease-and-injury-reports
Navy Influenza Surveillance Activities

- NHRC FRI program
  - Includes recruit training centers and participating ships
  - Describe circulating respiratory pathogens, including influenza
  - Identify pathogens in support of outbreaks
  - Contributes to FDA’s VRBPAC discussion for development of next year’s influenza vaccine
  - Contact NHRC at nhrc-fri@med.navy.mil for more information and to receive routine reports

- Can describe ILI outbreaks, anticipate duration of illness, describe extent of outbreak, and identify patterns to curtail disease spread
Navy Influenza Surveillance Activities

- Weekly SITREP including:
  - Vaccination rates
  - Overall flu burden
  - Active Duty/recruit burden
  - Description of hospitalized cases and trends
  - Noteworthy information in the open media

- Other reports to track vaccine use and disease burden for BUMED

- For more information and to access the latest SITREP, email: epi@nmcphc.med.navy.mil
Navy Influenza Surveillance Activities

- NMCPHC Influenza Advisory:
  - Navy flu reporting requirements in DRSi
  - Surveillance recommendations for upcoming season
  - Includes guidance on pneumonia surveillance in ESSENCE
  - [http://www.med.navy.mil/sites/nmcphc/program-and-policy-support](http://www.med.navy.mil/sites/nmcphc/program-and-policy-support) for more information
Army Influenza Surveillance

- Uses a combination of CHCS Ad Hoc Reporting, DRSi and ESSENCE
- CHCS flat files are sent from each Army lab on a weekly basis to USAPHC containing all positive and negative results of PCRs, cultures and rapid antigen testing
- Army influenza reports can be found at: http://phc.amedd.army.mil/whatsnew/Pages/PublicationDetails.aspx?type=USAPHC%20Influenza%20Surveillance%20Activity
Resources

USAFSAM/PHR Epidemiology Consult Service: Influenza Surveillance
https://gumbo2.area52.afnoapps.usaf.mil/epi-consult/influenza/

NMCPHC Epi Data Center: Influenza homepage
http://www.med.navy.mil/sites/nmcphc/program-and-policy-support/Pages/Influenza.aspx

US Army Public Health Command: Influenza Reports
http://phc.amedd.army.mil/whatsnew/Pages/PublicationDetails.aspx?type=USAPHC%20Influenza%20Surveillance%20Activity

MILVAX, Influenza – Seasonal vaccine information
http://www.vaccines.mil/Influenza_-_Seasonal

FLU.GOV “Know what to do about the flu”
http://www.flu.gov/

CDC Influenza Home Page
http://www.cdc.gov/flu/

WHO Global Influenza Surveillance Network: Manual for the laboratory diagnosis and virological surveillance of influenza
Contact Information

Air Force:
Email: episervices@wpafb.af.mil or usafsam.phrflu@us.af.mil (flu program)
Commercial (937) 938-3207; DSN 798-3207

Navy: Contact your cognizant NEPMU
NEPMU2: COMM: (757) 953-6600; DSN: (312) 377-6600
    Email: NEPMU2Norfolk-Threat-MedEpi@med.navy.mil
NEPMU5: COMM: (619) 556-7070; DSN (312) 526-7070
    Email: HealthSurveillance@med.navy.mil
NEPMU6: COMM: (808) 471-0237; DSN: (315) 471-0237
    Email: NEPMU6@med.navy.mil
NEPMU7: COMM (international): 011-34-956-82-2230 (local: 727-2230); DSN: 94-314-727-2230
    Email: NEPMU7@eu.navy.mil

Army:
USAPHC – Disease Epidemiology Program
Aberdeen Proving Ground – MD
COMM: (410) 436-7605   DSN: 584-7605
USAPHC.Disease.epidemiology@us.army.mil