



U.S. AIR FORCE

# Announcements



- Register for the Epi-Tech Trainings:
  1. Log-on or Request log-on ID/password:  
<https://tiny.army.mil/r/zB8A/CME>
  2. Register for Epi-Tech Surveillance Training:  
<https://tiny.army.mil/r/LEAid/EpiTechFY15>
  
- Please enter your name/service and e-mail into the chat box to the left or email the disease epidemiology program at:  
[usarmy.apg.medcom-phc.mbx.disease-epidemiologyprogram13@mail.mil](mailto:usarmy.apg.medcom-phc.mbx.disease-epidemiologyprogram13@mail.mil)
  - You will receive a confirmation email within the next 48 hours with your attendance record
  
- Please mute your phones and DO NOT place us on hold. Press \*6 to mute/unmute your phone.

*I n t e g r i t y - S e r v i c e - E x c e l l e n c e*



# Influenza in the DoD

USAF School of Aerospace Medicine / Epidemiology Consult Services

Presented by: DoD Global, Laboratory-based, Influenza Surveillance Program

Host: Col Federinko, MD, MPH, Gregory Wolff, MPH, Jeffrey Thervil, MPH, Amber Brown, MPH

DSN: 798-3196 (Comm: 937 938-3196)

29 September 2015



U.S. Army Medical Department

**ARMY PUBLIC HEALTH CENTER** (Provisional)



**NAVY AND MARINE CORPS PUBLIC HEALTH CENTER**

PREVENTION AND PROTECTION START HERE



# Influenza Outline



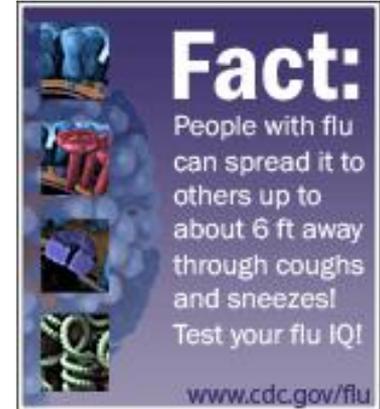
- I. About Influenza**
  - I. Clinical Information**
  - II. Subtypes and Strains**
  - III. Immunity-related Changes: Antigenic Drift/Shift**
  - IV. 2015-2016 Vaccine**
  - V. 2014-2015 Influenza Vaccine Facts**
- II. Influenza Surveillance in Military Populations**
  - I. Reportable Medical Event 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)



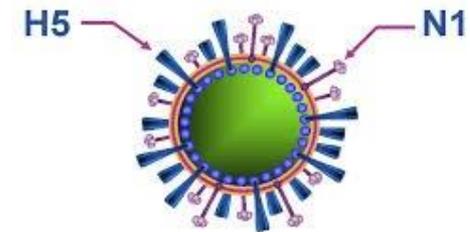


# Subtypes and Strains



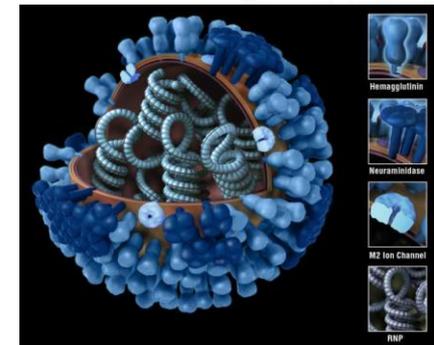
## • Influenza A

- 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:
  - Examples are Yamagata and Phuket
- Found primarily in humans
- May cause epidemics, but not pandemics





# Antigenic Drift



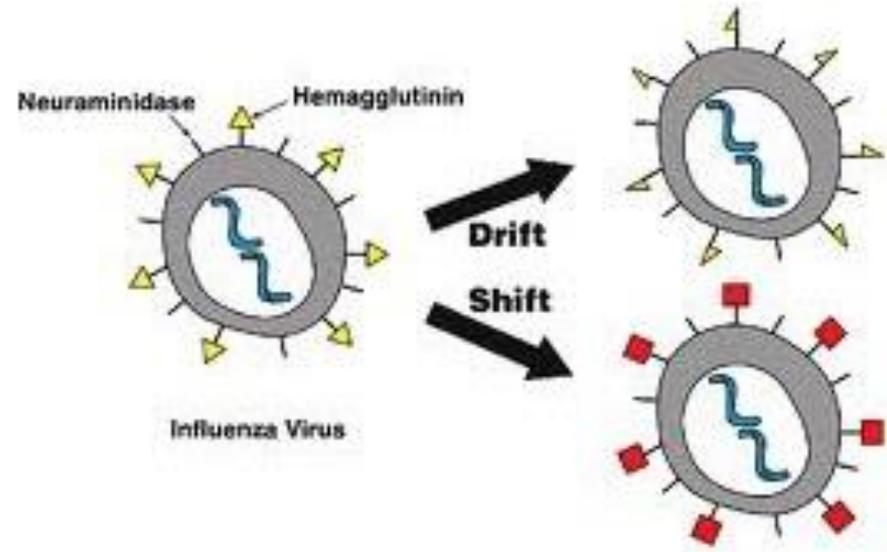
- **Immunity-related changes to influenza A virus**
  - Changes to regions of the HA surface protein can affect human antibody responses to the virus
- **Antigenic Drift**
  - Small gradual changes that occur over time and create a new strain that may not be recognized by immune system
    - Reason that 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**



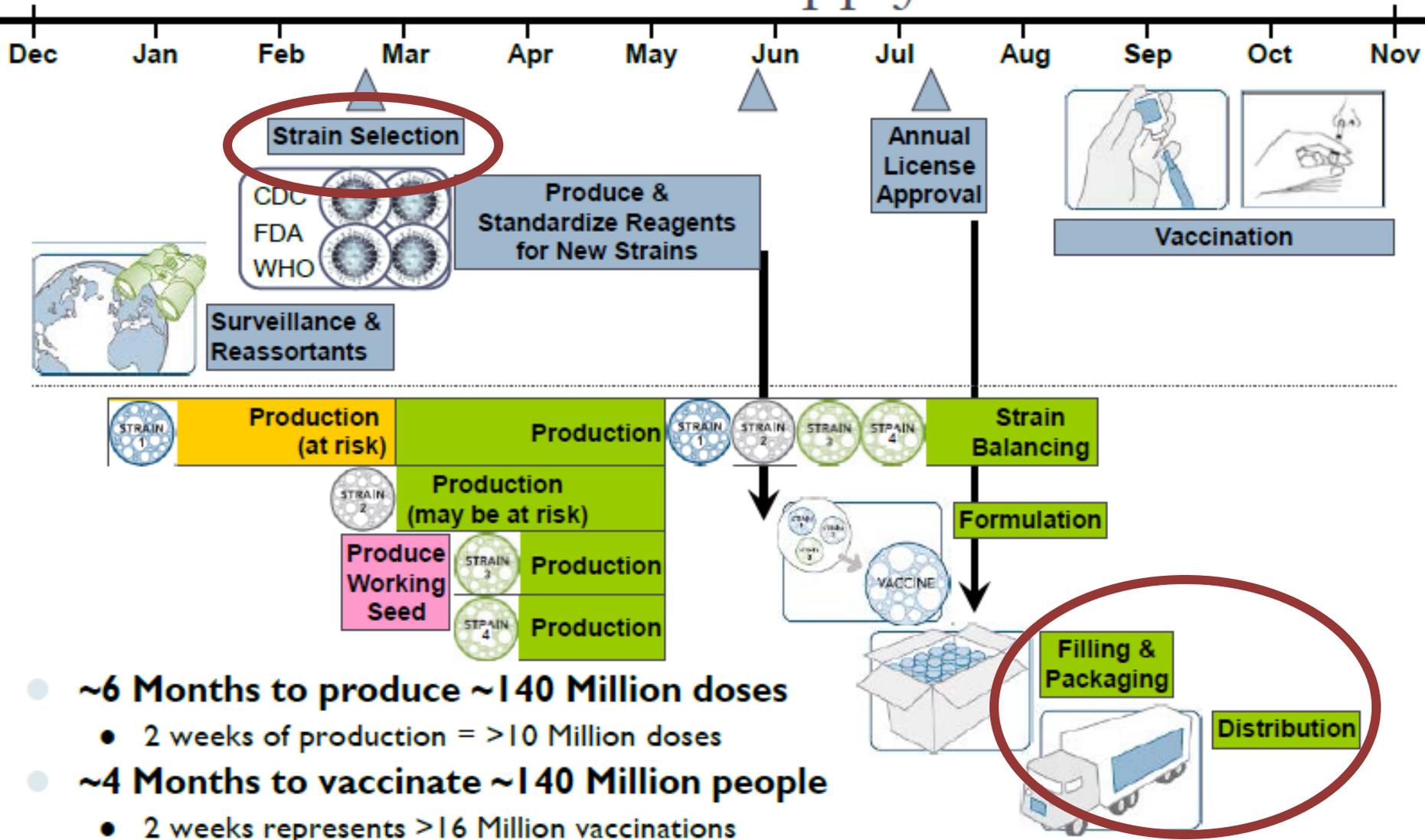


# Vaccine



- **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 over 3.5M 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/Phuket

# Annual Influenza Vaccine Manufacturing Timeline for entire US Supply



- **~6 Months to produce ~140 Million doses**
  - 2 weeks of production = >10 Million doses
- **~4 Months to vaccinate ~140 Million people**
  - 2 weeks represents >16 Million vaccinations



# 2014-2015 Influenza Season Vaccine Mismatch



- In mid to late February 2014, WHO and FDA recommended for the 2014-2015 influenza vaccine (Northern Hemisphere) to include the following components:
  - A/California/7/2009 (H1N1)pdm09-like virus
  - A/Texas/50/2012 (H3N2)-like virus
  - B/Massachusetts/2/2/2012-like virus
  - Quadrivalent vaccine also included an additional B virus (B/Brisbane/60/2008-like virus)
- Late March 2014: drifted A(H3N2) viruses were detected during routine surveillance testing (4% antigenically distinct from A/Texas)
- Jun-Aug 2014: approximately 1/3 of circulating viruses are antigenic drift variants
- Sept 2014: nearly 2/3 of circulating viruses are drifted; WHO recommends A/Switzerland/2013-like virus for the southern hemisphere
- 52% of influenza A(H3N2) viruses collected and analyzed in the U.S. from 1 October – 22 November 2014 were antigenically different from the A(H3N2) vaccine virus.
  - Reason for the reduced vaccine effectiveness against A(H3N2) viruses this season.
  - Most of the drifted A(H3N2) viruses were A/Switzerland/9715293/2013 viruses, which was the A(H3N2) virus selected for the 2014 Southern Hemisphere influenza vaccine.



# Influenza A/H3N2 HA Phylogenetic Analysis 2014-2015



N=523

**A(H3N2) Vaccine strain: A/Texas/50/2012**

Reference Strain

October 2014 4%

November 2014 13%

December 2014 68%

January 2015 15%

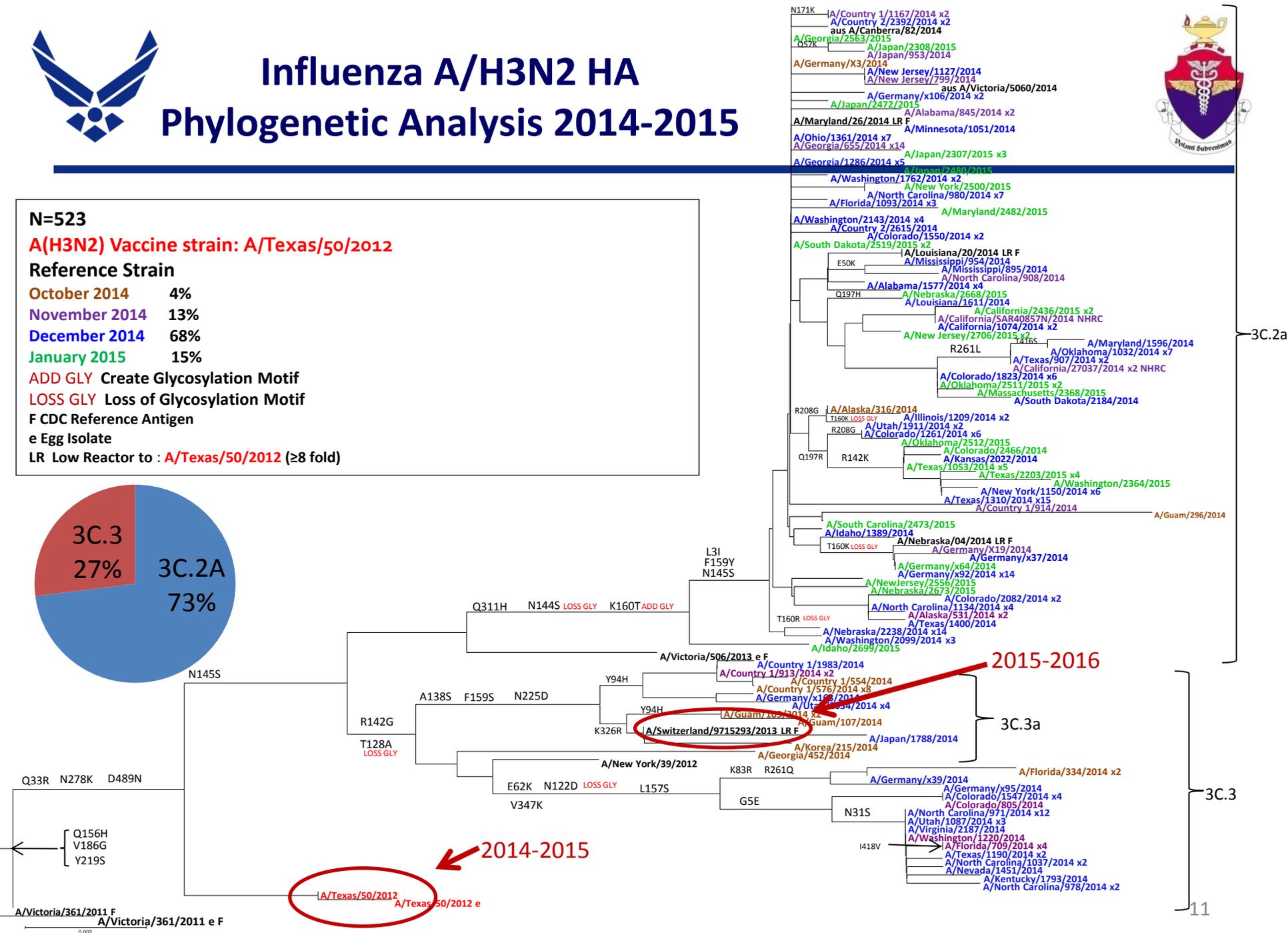
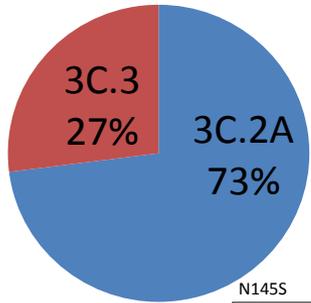
ADD GLY Create Glycosylation Motif

LOSS GLY Loss of Glycosylation Motif

F CDC Reference Antigen

e Egg Isolate

LR Low Reactor to : A/Texas/50/2012 (≥8 fold)



3C.2a

2015-2016

3C.3a

3C.3

11

2014-2015

A/Texas/50/2012  
A/Texas/50/2012 e



# 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, BUMED INST 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)



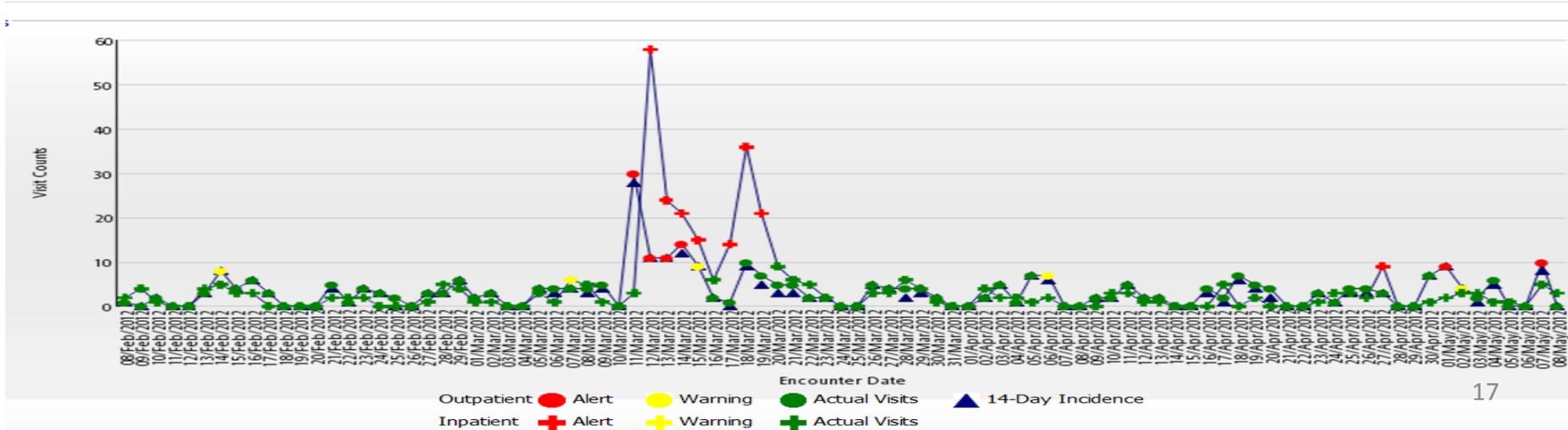
Influenza-associated Hospitalization	
<b>Criteria</b>	
Included population	< 65 years of age Any beneficiary type/mandate status
Patient status	Influenza-associated hospitalization Fever $\geq 100.5^{\circ}\text{F}$ with cough or sore throat in absence of other diagnosis
Laboratory	Positive rapid or confirmatory test < 4 days after hospital admission
<b>Case Classification</b>	
Confirmed	Meet criteria with confirmatory lab test (RT-PCR, culture, IFA, IHC, HI titer)
Probable	Meet case definition with positive rapid antigen test
<b>Notes</b>	
	For all confirmed cases, a nasal wash specimen should be submitted to an appropriate lab for further influenza lab testing (i.e. sequencing)



# 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 for early detection with maximum sensitivity
  - Often at the cost of specificity (false alerts)





# ILI Syndromic Surveillance



- ILI
  - No influenza specific ICD codes
  - Includes ICD, CPT and Chief Complaint data
- Influenza Specific
  - Influenza specific ICD codes only
- For more information on ESSENCE, please refer to <https://gumbo2.area52.afnoapps.usaf.mil/epi-consult/training/index.cfm>



# DoD Global, Lab-based, Influenza Surveillance Program



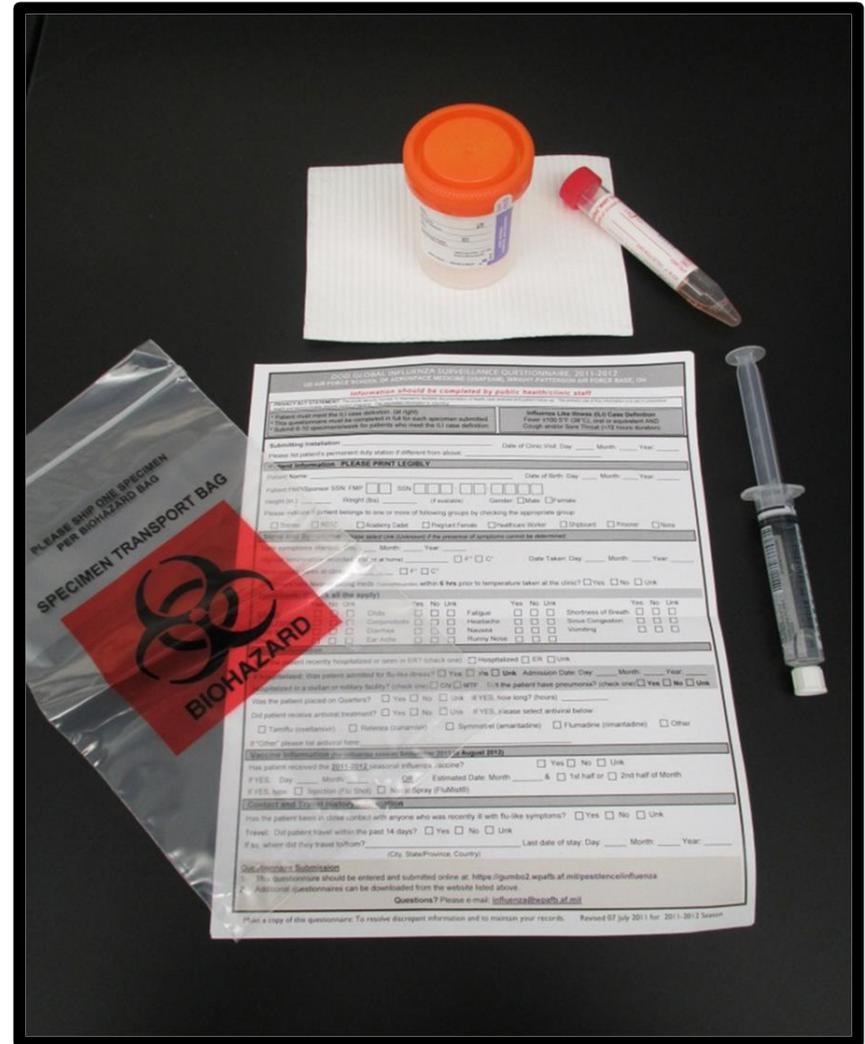
- **AF Influenza Program “Project Gargle” : 1976-1997**
- **National Science and Technology Council Presidential Decision Directive (NSTC PDD-7)**
  - U.S. not prepared for threat posed by emerging infectious diseases
  - Action taken and AF was assigned lead executive agent for DoD influenza surveillance
- **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

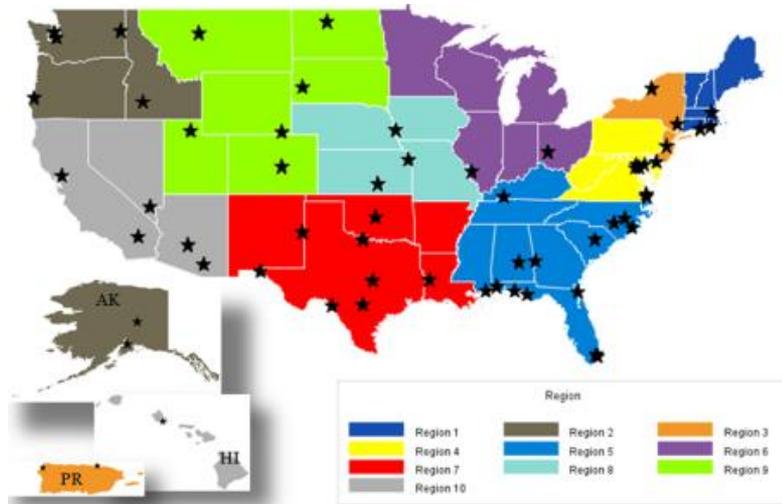




# DoD Global, Lab-based, Influenza Surveillance Program



## Sentinel Surveillance Sites 2014-2015

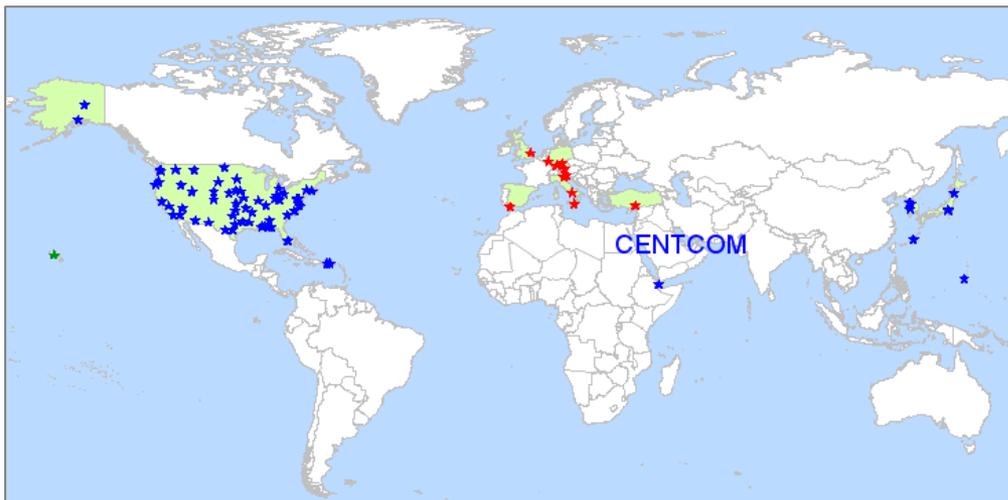


### CONUS Sites: 55

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

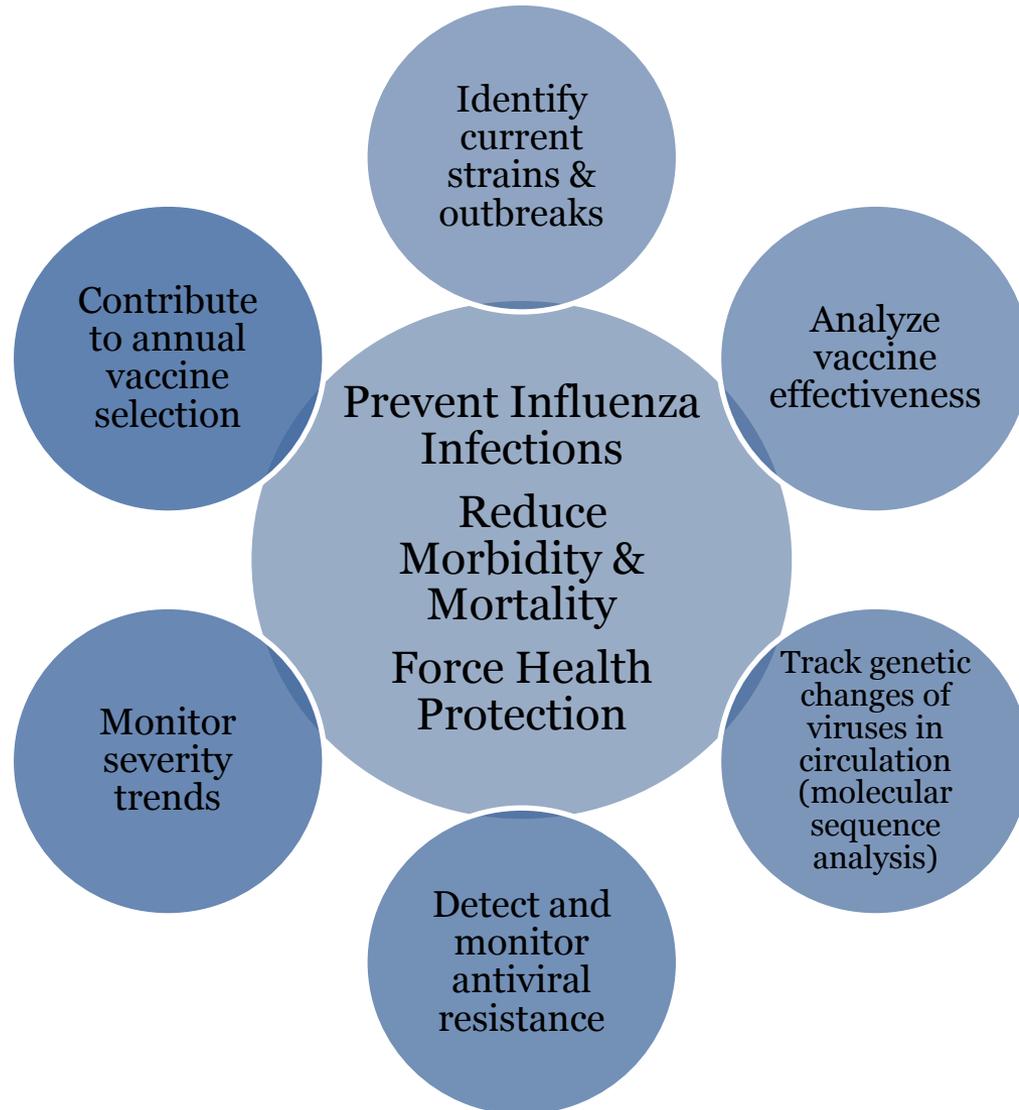
### OCONUS Sites: 36

- Air Force: 18
- Army: 9
- Navy & Marine Corps: 7
- Coast Guard: 2



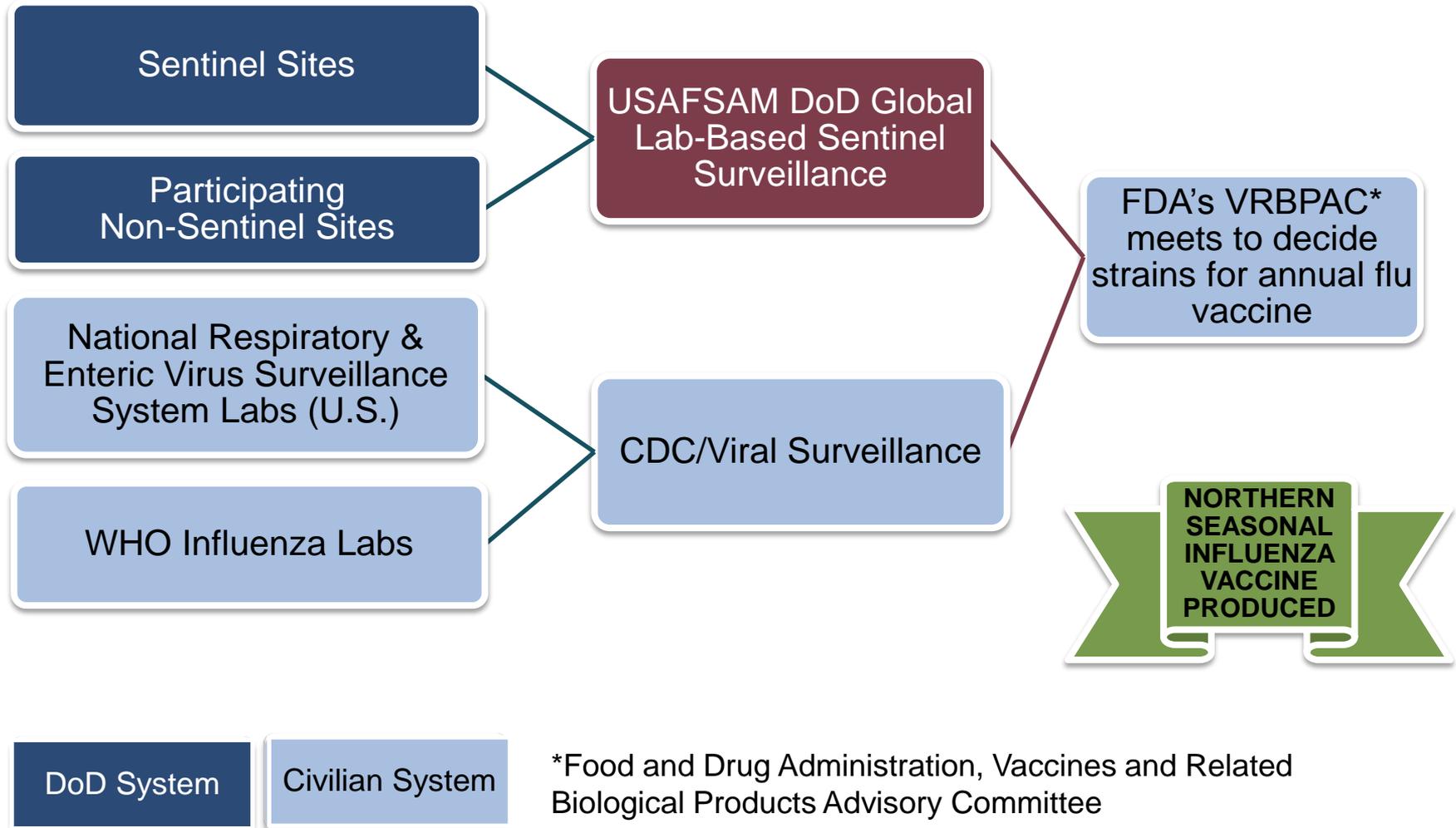


# DoD Global, Lab-based, Influenza Surveillance Program





# Surveillance Process and Vaccine Development





# DoD Global, Lab-based, Influenza Surveillance Program



<https://gumbo2.area52.afnoapps.usaf.mil/epi-consult/influenza>

- 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

**USAFSAM/PHR**  
Epidemiology Consult Service

### Hot Topics

- DoD Flu Surveillance
  - Welcome Packet
  - Weekly Reports
  - Surveillance Dashboard
  - Sentinel Site Resources
  - Surveillance Site
  - Novel Virus
- Entomology
- Field Support
- Food Protection
- Hearing Conservation
- Mortality Registry
- Outbreak Investigation
- Public Health Dashboard

### DoD Influenza Surveillance

→ Welcome Packet - 2014-15 Season

Welcome to the DoD Global, Laboratory-based Influenza Surveillance Program. If you are a sentinel site, we have compiled key resources (links below) to help prepare for the upcoming 2014-2015 influenza surveillance season.

The data gathered from your site will be used to track influenza activity, monitor the trends in new and existing influenza virus strains, and will be used to help shape next season's influenza vaccination.

#### DoD Policy

Sentinel Sites for the 2014-2015 Influenza Surveillance Program

Training  
Visual: Site Training Presentation - EDE | EEE  
Audio/Video: Sentinel Site Training Presentation 2013-2014 - Audio.DOC | Video.DOC

Surveillance Questionnaire

### → Surveillance Data

- Weekly Influenza Surveillance Reports
  - USAFSAM Weekly Influenza Surveillance Reports
  - EUCCOM Weekly Influenza Surveillance Reports
- Surveillance Dashboard
- Site & Service Specific Data
- Aggregate Specimen Results
- Influenza Like Illness Graphs



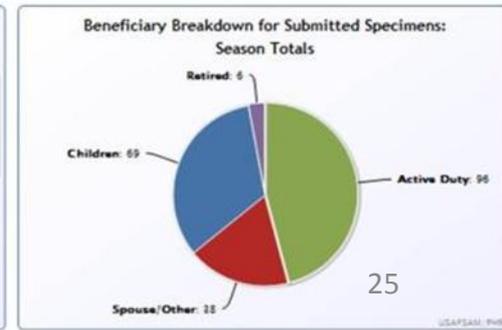
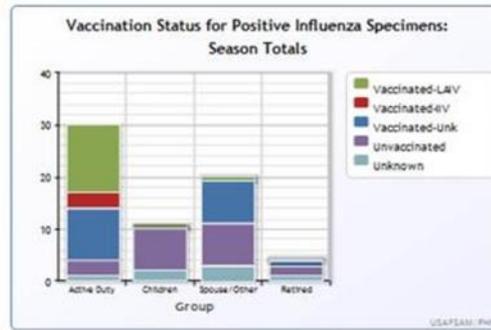
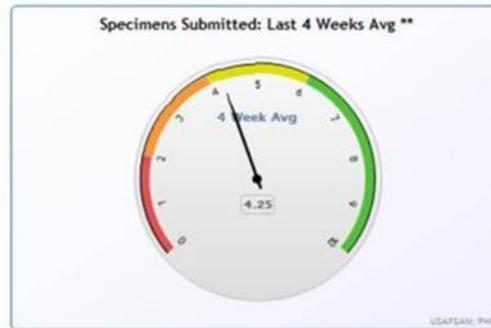
# Influenza Dashboard



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

<https://gumbo2.area52.afnoapps.usaf.mil/epi-consult/influenza/dashboard/>

WEEKLY SPECIMEN TOTALS									
Week	Influenza A	Influenza A(H1N1) pdm09	Influenza A (H3N2)	Influenza B	Bacterial Pathogen	Other Pathogen(s)*	No Pathogen Detected	Not Performed	Total
40	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	1	0	1
42	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	1	0	1
46	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	1	0	1
2	0	1	0	0	0	0	0	0	1
3	0	2	0	0	0	0	1	0	3
4	0	7	0	0	0	0	1	0	8
5	0	3	0	0	0	1	0	0	4
6	0	0	0	0	0	2	0	0	2
7	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
9	0	1	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	1	0	0	1





# 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
  - 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](mailto: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



## DON Influenza SITREP

2014-2015 Influenza Season  
Week 9 (1 March — 7 March 2015)

### Influenza Activity and Surveillance

#### Laboratory:

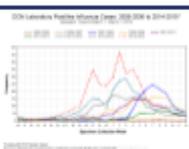
There were 78 laboratory positive influenza results among DON beneficiaries during Week 9, less than the previous week yet slightly above the seasonal baseline. [More](#)

#### Antivirals:

A total of 162 AV medications were dispensed to DON beneficiaries during Week 9, decreasing since last week, yet more than twice the seasonal baseline. [More](#)

#### Influenza-Like Illness:

Overall, 4.9% of outpatient medical encounters were due to influenza-like illness (ILI); this was slightly above the seasonal baseline. [More](#)



### Severity Indicators

#### Inpatient:

One of the 29 inpatient influenza tests performed during Week 9 were positive. This week, eight inpatient AV prescriptions were dispensed, and one inpatient case was reported to DRSI. [More](#)

#### Coinfections:

There were no bacterial coinfections identified among DON beneficiaries since our last report. [More](#)

### Vaccination

94.0% of Navy and 92.2% of Marine Corps active duty service members have received an influenza vaccine (as of 7 March 2015).

[More](#)

### Select Populations

#### Active Duty & Recruits:

In Week 9, eight Navy and five Marine Corps active duty service members had laboratory positive influenza results. There were no laboratory positive influenza tests among DON recruits. [More](#)

NHRC reports febrile respiratory illness (FRI) rates at Navy and Marine Corps recruit training facilities were at or below expected values during Week 8. [More](#)

#### Children:

Laboratory influenza rates in the 0-4 and 5-17 age groups were 10.6 and 8.5 per 100,000, respectively. There were 57 AV prescriptions dispensed to children this week, almost *two times* the seasonal baseline. [More](#)

- Weekly SITREP including:
  - Vaccination rates
  - Overall flu burden
  - Active Duty/recruit burden
  - Description of hospitalized and outpatient 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: [usn.hampton-roads.navmcpubhlthcenpors.list.nmcphc-epi@mail.mil](mailto:usn.hampton-roads.navmcpubhlthcenpors.list.nmcphc-epi@mail.mil)

Contact Information: Gosia Nowak, 757-953-0979, [gosia.nowak@med.navy.mil](mailto:gosia.nowak@med.navy.mil) ~ On the Web: <http://go.usa.gov/DtUC>





# Navy Influenza Surveillance Activities



- NMCPHC Seasonal 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/Pages/Influenza.aspx> for more information



**NAVY AND MARINE CORPS PUBLIC HEALTH CENTER**  
PREVENTION AND PROTECTION START HERE

## Navy and Marine Corps Public Health Center (NMCPHC) Surveillance Advisory: Seasonal Influenza 10 September 2015

### Issue

- Influenza vaccine for the upcoming flu season is becoming available throughout the Department of Defense (DoD) beginning this month and immunization campaigns are underway.
- DoD policy requires influenza vaccination for all Active Duty and Reserve Component personnel.
- NMCPHC influenza surveillance strategy includes central analysis of electronic clinical data, local ESSENCE monitoring, Fleet Disease and Injury tracking, and reporting of hospitalizations associated with laboratory confirmed influenza via Disease Reporting System internet (DRSi).
- The topic of September's Tri-Service Disease Surveillance Training is 'Influenza Surveillance'. For information about how to join this online discussion on 29 September contact the DRSi helpdesk as described below.

### Background

Influenza, or the flu, is a viral illness characterized by the sudden onset of fever, respiratory symptoms and fatigue. Influenza season in the United States typically peaks in January and February and can begin as early as October. While most people infected with the influenza virus



## Creating a User Defined Pneumonia Syndrome in DOD ESSENCE

Preventive Medicine Directorate User Guide  
Sept 2013



**NAVY AND MARINE CORPS PUBLIC HEALTH CENTER**  
PREVENTION AND PROTECTION START HERE

[WWW.NMCPHC.MED.NAVY.MIL](http://WWW.NMCPHC.MED.NAVY.MIL)



# 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/>

**Navy and Marine Corps Public Health Center: Influenza homepage**

<http://www.med.navy.mil/sites/nmcphc/program-and-policy-support/Pages/Influenza.aspx>

**Army Public Health Center: Influenza Reports**

<http://phc.amedd.army.mil/whatsnew/Pages/PublicationDetails.aspx?type=APHC%20Influenza%20Surveillance%20Activity>

**DHA Public Health Division, Immunization Healthcare Branch, 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**

[http://whqlibdoc.who.int/publications/2011/9789241548090\\_eng.pdf](http://whqlibdoc.who.int/publications/2011/9789241548090_eng.pdf)



**U.S. AIR FORCE**

---



# ***QUESTIONS ?***

---

*Integrity - Service - Excellence*



**U.S. AIR FORCE**

# Contact Information



- Army: APHC – Disease Epidemiology Program  
Aberdeen Proving Ground – MD  
Comm: (410) 436-7605 DSN: 584-7605  
[usarmy.apg.medcom-phc.mbx.disease-epidemiologyprogram13@mail.mil](mailto:usarmy.apg.medcom-phc.mbx.disease-epidemiologyprogram13@mail.mil)
  
- Navy: Contact your cognizant NEPMU  
NEPMU2: COMM: (757) 950-6600; DSN: (312) 377-6600  
Email: [usn.hampton-roads.navhospporsva.list.nepmu2norfolk-threatassess@mail.mil](mailto:usn.hampton-roads.navhospporsva.list.nepmu2norfolk-threatassess@mail.mil)  
NEPMU5: COMM: (619) 556-7070; DSN (312) 526-7070  
Email: [HealthSurveillance@med.navy.mil](mailto:HealthSurveillance@med.navy.mil)  
NEPMU6: COMM: (808) 471-0237; DSN: (315) 471-0237  
Email: [usn.jbphh.navenpvntmedusixhi.list.nepmu6@mail.mil](mailto:usn.jbphh.navenpvntmedusixhi.list.nepmu6@mail.mil)  
NEPMU7: COMM (int): 011-34-956-82-2230 (local): 722-2230; DSN: 94-314-727-2230  
Email: [NEPMU7@eu.navy.mil](mailto: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  
[episervices@us.af.mil](mailto:episervices@us.af.mil)

*Integrity – Service – Excellence*