United States (US) Department of Defense (DoD) Global, Laboratory-Based Influenza Surveillance Program at the US Air Force School of Aerospace Medicine (USAFSAM)


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Background.
USAFSAM serves as the DoD Influenza Reference Center, providing a global, laboratory-based, influenza and viral respiratory surveillance system for DoD beneficiaries and some non-US citizens. This system augments the World Health Organization (WHO) Global Influenza Surveillance Network (GISN) activities year-round. This is accomplished by: 1) isolating and identifying circulating viruses, 2) evaluating influenza vaccine effectiveness, 3) detecting newly emerging strains, and 4) providing data and original specimens as needed to GISN through the US Centers for Disease Control and Prevention (CDC).

Methods.
Over 70 global sites collect epidemiologic data and specimens from patients with influenza-like illness and send them to USAFSAM for data and laboratory analysis. All specimens are cultured, molecularly characterized, and many influenza viruses are further sequenced. USAFSAM maintains an archive of isolates and original specimens. Surveillance data are shared with participating sites, DoD, CDC, and the WHO. Original specimens and isolates are shared with CDC for antigenic characterization and as reference and vaccine seed strains. The global influenza surveillance program at USAFSAM has been tracking viral respiratory disease within the US military community for over 35 years.
**Results.**

Between 1998-2011, 69,786 specimens from 43 countries have been processed, with 17,894 (26%) being influenza; 15,114 (84%) influenza A and 2,780 (16%) B. Prior to our initial case of pandemic influenza (April 14, 2009), 17% (range 5-29%) were influenza and 33% thereafter. Flu A and B percentages varied by seasonal year. Flu B was most frequent (57%) during the 2000-01 seasonal year. Flu A dominated in other years, up to 93% in 2003-04. Over the five seasons where flu A subtypes were routinely tested, H1 predominated in three and H3 in two seasons. In 2008-2009, the earliest US detections of 2009 H1N1 occurred nearly simultaneously at the Naval Health Research Center, San Diego, California, and USAFSAM; USAFSAM processed 19,072 specimens that year. Vaccine-related contributions from this program have included at least 9 virus seed and/or reference strains.

**Conclusion.**

The DoD, Laboratory-Based, Influenza Surveillance Program managed at USAFSAM, with support by the Armed Forces Health Surveillance Center, Division of GEIS Operations, has evolved and strengthened laboratory capability in collaboration with the DoD, CDC, and WHO with important contributions to international surveillance, prevention, and early detection of pandemics. The world has just experienced one pandemic and another influenza pandemic threat looms from the unprecedented outbreak of highly-pathogenic avian influenza. How concerned should we be and are there steps that our laboratories can take to help detect and prevent the spread of pandemic influenza strains? This presentation provides an overview of surveillance activities and the importance of laboratory participation in this larger public health mission. Specimen handling, shipping methodologies, testing and results are discussed. We present a model for military cooperation in global surveillance and response against the influenza threat, a system in operation since 1976.