

# Understanding Flu and Biologic Events

## VDH 2013 EMS Symposium

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**FALLOUT SHELTER**

FEBRUARY 24, 2003

www.time.com AOL Keyword: TIME

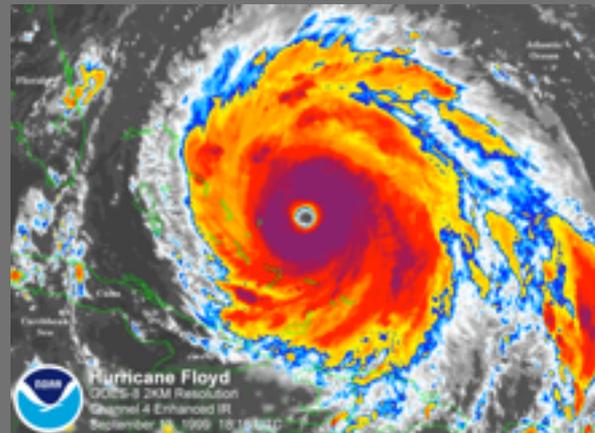


# AMERICA THE ANXIOUS

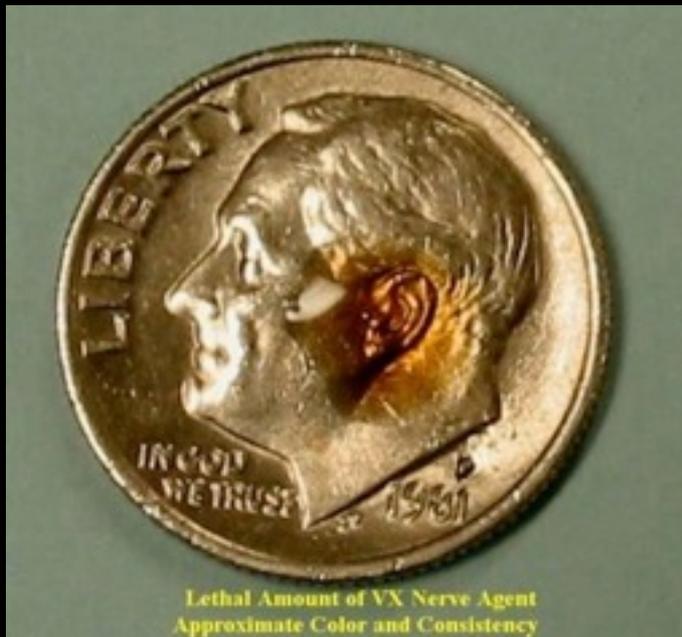
Bush's march toward war splits the nation, while terror alerts leave many scared and confused



# The Rule of Outcomes



# ONE LETHAL DOSE OF VX



Lethal Amount of VX Nerve Agent  
Approximate Color and Consistency

# 15,000 LETHAL DOSES OF BOTULINUM TOXIN



<b>Agent</b>	<b>Dissemination</b>	<b>Transmission (Person to Person)</b>	<b>Incubation</b>	<b>Lethality</b>
<b>Anthrax</b>	<b>Spores in Aerosol</b>	<b>No (except cutaneous)</b>	<b>1-5 Days</b>	<b>High</b>
<b>Cholera</b>	<b>Ingestion &amp; Aerosol</b>	<b>Rare</b>	<b>12 Hours to 6 Days</b>	<b>Low with Treatment</b>
<b>Plague</b>	<b>Aerosol</b>	<b>High</b>	<b>1-3 Days</b>	<b>High if Untreated</b>
<b>Tularemia</b>	<b>Aerosol</b>	<b>No</b>	<b>1-10 Days</b>	<b>Moderate if Untreated</b>
<b>Q Fever</b>	<b>Ingestion &amp; Aerosol</b>	<b>Rare</b>	<b>14-16 Days</b>	<b>Very Low</b>
<b>Smallpox</b>	<b>Aerosol</b>	<b>High</b>	<b>10-12 Days</b>	<b>Low</b>
<b>VEE</b>	<b>Aerosol &amp; Infected Vectors</b>	<b>Low</b>	<b>1-6 Days</b>	<b>Low</b>
<b>Ebola</b>	<b>Contact &amp; Aerosol</b>	<b>Moderate</b>	<b>4-16 Days</b>	<b>Moderate to High</b>
<b>Botulinum Toxin</b>	<b>Ingestion &amp; Aerosol</b>	<b>No</b>	<b>Hours to Days</b>	<b>High</b>
<b>T-2 Mycotoxins</b>	<b>Ingestion &amp; Aerosol</b>	<b>No</b>	<b>2-4 Hours</b>	<b>Moderate</b>
<b>Ricin</b>	<b>Ingestion &amp; Aerosol</b>	<b>No</b>	<b>Hours to Days</b>	<b>High</b>

# Smallpox

Responsible for over 500 million deaths worldwide in the 20<sup>th</sup> century alone

# Smallpox

Forms and Effects of  
Smallpox:

Varioloid Rash Form

1-3% Fatalities

Classic Smallpox Form

Three Subtypes

Discrete Type

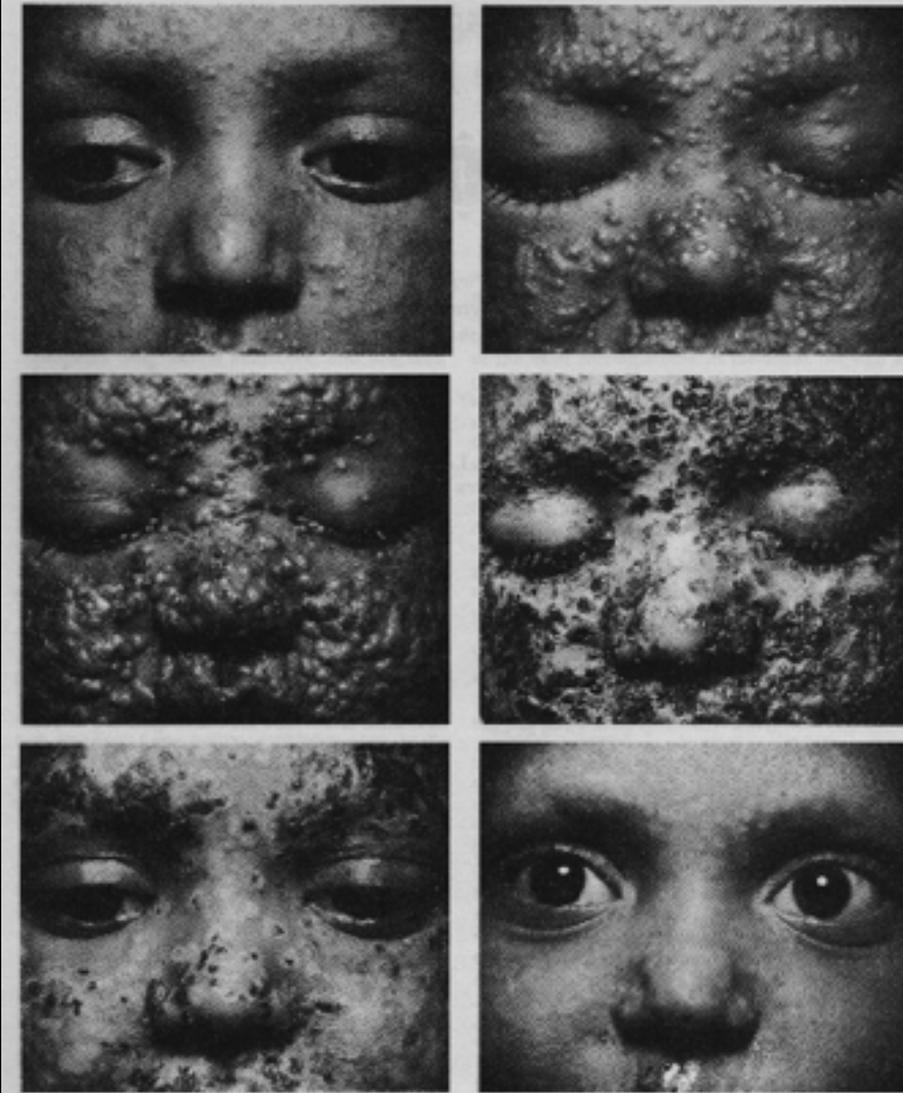
Semiconfluent Type

Confluent Type

Classic Smallpox – Discrete Type

Flat Hemorrhagic  
Form

Nearly 100% Fatalities



Progression of  
classic Smallpox  
showing various  
phases including  
Vesicles, Pustules,  
Scabs and then  
Scars.



Chicken Pox



Adult Measles

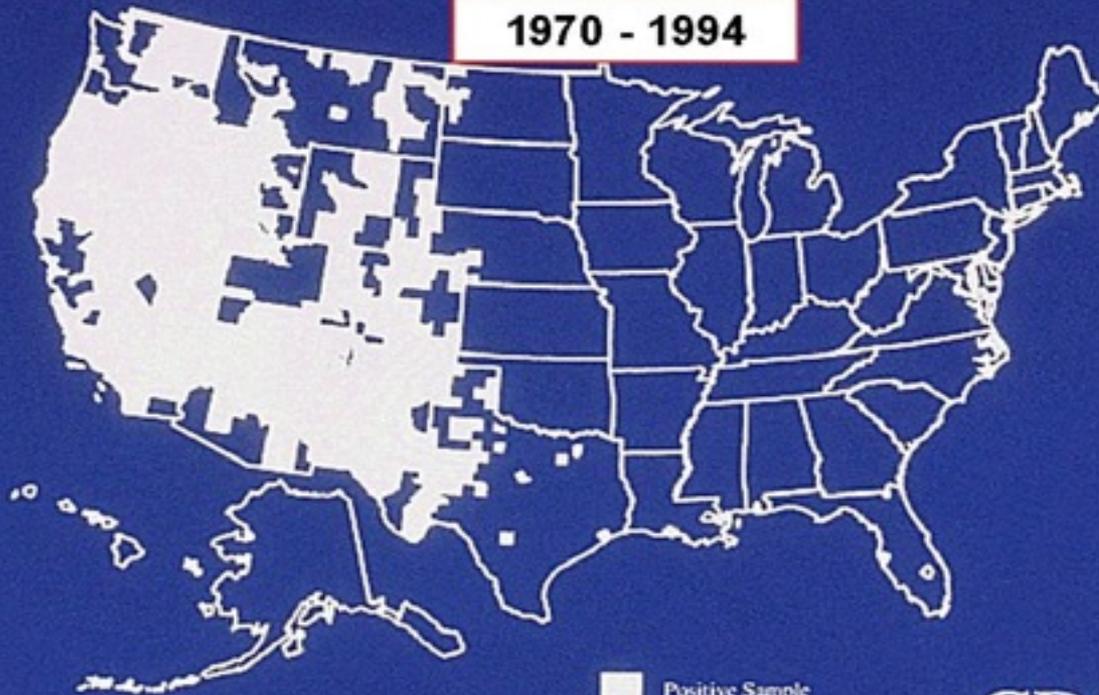


Small Pox

# Plague

## Counties with Plague-Positive Samples

1970 - 1994



**CDC**  
Centers for Disease Control  
and Prevention

# Plague

Forms of Plague and  
untreated fatality rates:

**Bubonic Form** (84% of cases)  
40-60% Fatalities

**Pneumonic Form** (2-12% of cases)  
90-100% Fatalities

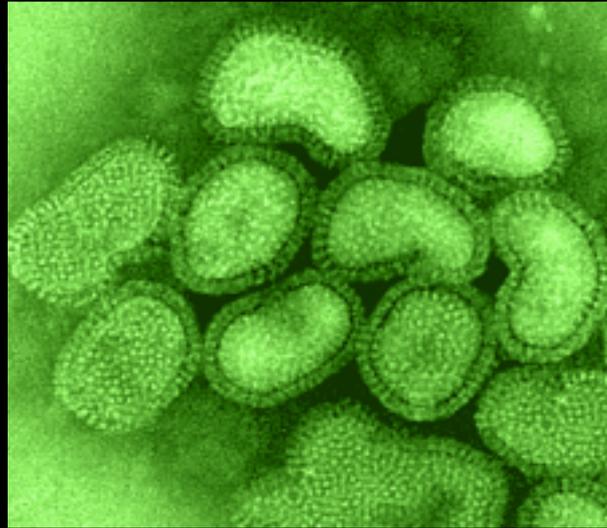
**Septicemic Form** (3-13% of cases)  
Nearly 100% Fatalities

# Plague

skin necrosis to the fingers,  
toes, and groin

# Seasonal Flu

# CoV



Influenza Virus Particles  
[www.virology.net](http://www.virology.net)

# H<sub>X</sub>N<sub>Y</sub>

# Pandemic

Monday, September 8, 2003

Lifeline

'Dickie Roberts' sits atop end-of-summer box office



\$7 million debut: David Spade's 'Dickie Roberts'...

How slow was it in theaters that weekend? David Spade suffered his second-worst debut ever and still came out on top at the box office. Spade, who has never opened a film at No. 1, 'powered' Dickie Roberts...

By Scott Bowles

Singer/songwriter Warren Zevon dies



The musician Warren Zevon died in his sleep at home...

Warren Zevon, who struggled with terminal cancer while finishing his latest album, 'The Wind', died Sunday in his sleep at his home in Silver Lake, Calif. a spokesman said. Zevon was 50. He was the author of such very raucous, as 'Werewolves of London' and 'Jail Song When I'm Dead'.

Simon & Garfunkel, together again?

Paul Simon and Art Garfunkel are expected to announce plans for a reunion concert that they first since 1994. Their publicity agent, talking about the two, have called a press conference at New York's Bowery Ballroom to make "a very special announcement." The folk-rock duo broke up more than 30 years ago and have had a fractious relationship since. Reunion rumors have swirled since February when the duo performed The Sound of Silence at the Grammys.

Musicians take the day off on Sept. 11

Several touring acts have decided not to perform on Thursday out of respect for the victims of the Sept. 11, 2001, terrorist attacks. Bruce Springsteen and the E Street Band, Cher, Toby Keith, Sade, Dan Aykroyd and Mac and the Aerosmiths are among the artists taking the day off Thursday, Billboard reports.

Launch a search for stolen artworks

The American Association of Museums is launching a Web site today that allows people to search U.S. museum collections for artworks that may have been stolen by the Nazis. The Nazi-Era Provenance Internet Portal, at www.naziart.org, is a searchable index of art and other items that changed hands in Europe between 1932 and 1946.

Johnny Depp disavows anti-USA quotes

Actor Johnny Depp says seemingly anti-American quotes made to German magazine Stern were taken out of context. Stern quoted Depp as saying, "America is... like a dumb puppy that has big teeth that can bite and hurt you." In a statement, Depp says he was referring to America being a young and growing nation. "I am an American. I love my country and have great hopes for it," says Depp, who lives in France.

By César C. Soriano with staff and wire reports. E-mail: Lifeline@usatoday.com



Ben-Jen wedding countdown, 3D

Kidman, Hopkins are hot in Toronto, 4D

Homeownership is college course, 6D

tomatoes: \$2.29
shampoos: \$1.45
laundry detergent: \$6.50
flowers: \$9.99
chocolate donuts: \$4.09
ketchup: \$2.25
panty hose: \$6.99
not having to carry cash: priceless
The new MasterCard® at supermarkets everywhere.



SARS has been vanquished, but for how long? Experts nervously wait for nature's response.

CDC's Team P (for pandemic) includes Nancy Cox, center, Maria Cosen, left, Ryo Fukuda, Umesh Parashar, Scott Harper, Edward Breck and Raymond Strle. The group is one of 21 teams assigned to carry out the SARS control effort.

By Steve Sternberg USA TODAY

Like tap-drum partners in a raucy global grade match, SARS and West Nile viruses have traded places, at least for now. But when the weather turns cool, avian-flu viruses may be back. Researchers say the deadly coronavirus that causes severe acute respiratory syndrome, known as SARS, still lurks in animals. That means it could again make the leap into humans. Even now, public health officials at the World Health Organization, the U.N.'s health agency, and the U.S. Centers for Disease Control and Prevention are gearing up for SARS' return.

Cover story

It's possible that the SARS virus leap from animals to humans was a one-off event. If that's the case, we've seen the last of the virus," says WHO spokesman Ian Strlemp. "It's quite possible that the virus is seasonal, like influenza, responding to climate changes and other factors. If that's the case, it may well come back in the fall." WHO last week urged medical authorities to launch the vaccination drives to prevent confusion if SARS should reappear. Not all of those sounding the SARS alarm are public health experts. Intelligence officials also take SARS seriously, describing it in terms they usually reserve for threats to national security. "We remain vigilant," the National Intelligence Council, which advises CIA director George J. Tenet, reported last week.

'Amnesty' for song swappers?

But RIAA deal could lead to bigger fines

By Jefferson Graham USA TODAY

The battle between the record industry and individuals who upload online music has a new wrinkle. Even as the Recording Industry Association of America is cracking down on file swappers, it also is willing to offer "amnesty." In exchange for wiping unauthorized song services and the tunes off the hard drive, and agreeing such as a statement letter, the RIAA will agree not to file civil suits. But, if the parties discovered trading songs in the future, the association could come back with criminal charges, which carry even heavier fines. That's why Washington, D.C., attorney Morgan Gray says signing the kind of letter "is tantamount to agreeing to have an electronic search around your ankle for the rest of your life." In the wake of a dramatic drop in sales

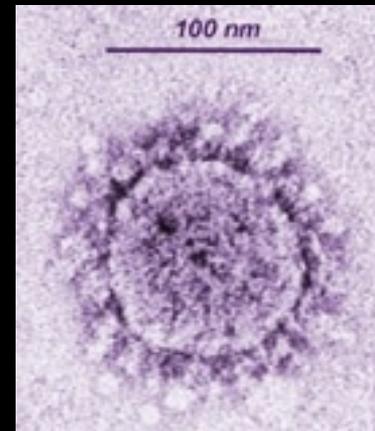
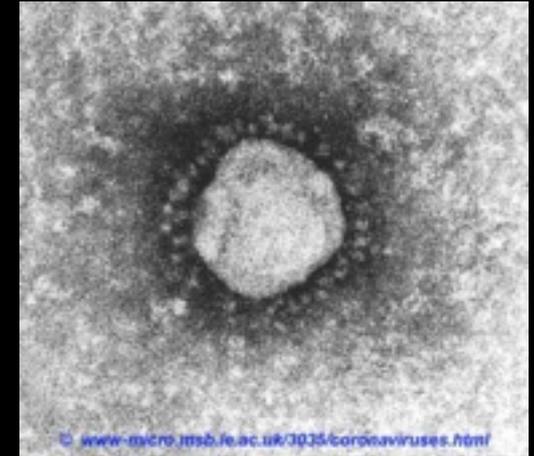
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Monday, September 8, 2003

Obama... \$1,000 to work out a settlement... Los Angeles lawyer Joseph Singleton says someone who wants to fight the industry is looking at anywhere from \$30,000 to \$100,000. The copyright act provides for attorney fees in both directions, so the RIAA could end up footing the bill." Bob Barnes, a Fresno, Calif., tax driver whose name was given to the RIAA by his Internet provider, hasn't sought legal help yet. "It's well-and-true," says Barnes, 51. "If they sue me, I guess I'll need a lawyer. If not, then I won't. There's nothing I can really do about it until then, is there?"

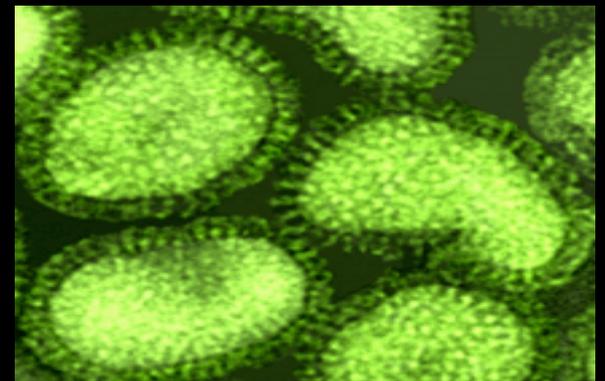
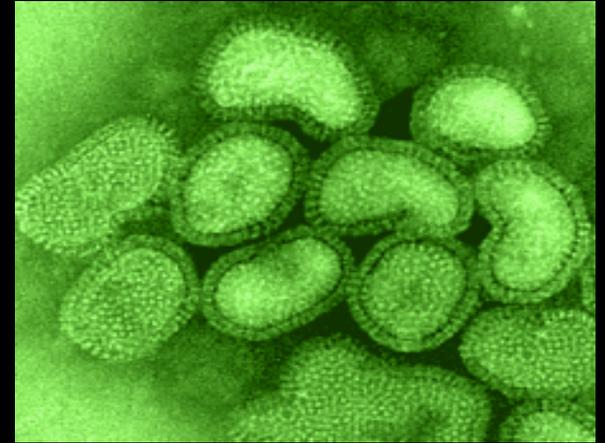
## What was SARS?

- Novel Coronavirus (NCoV)
- MERS - 2013/2014
- Close person-to-person contact with respiratory secretions
- Contaminated surfaces and items (3 hours after drying)
- Civet Cat Theory



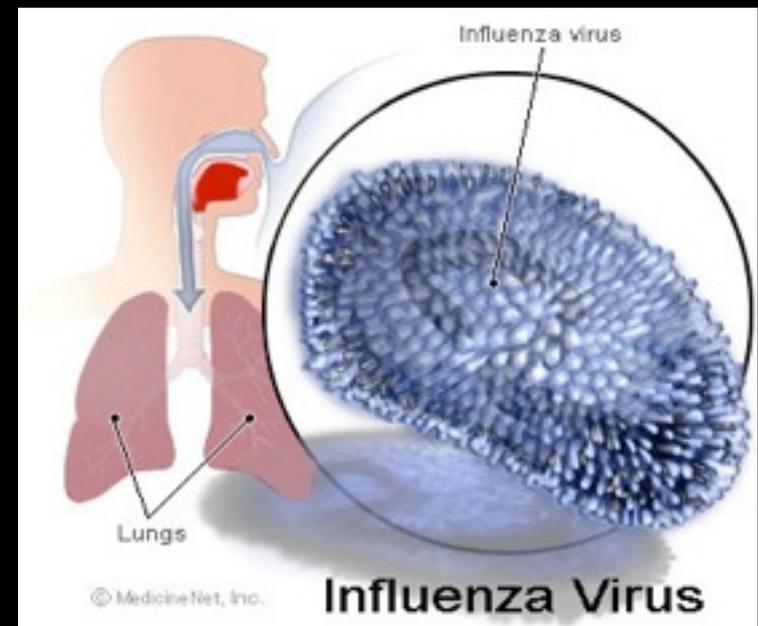
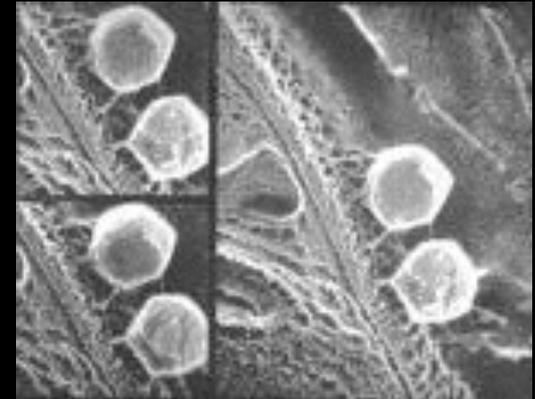
# Influenza

- What is influenza?
- What causes it?
- What are Types A, B, and C?
- How much does it affect us normally?
- Bird flu is not pandemic influenza



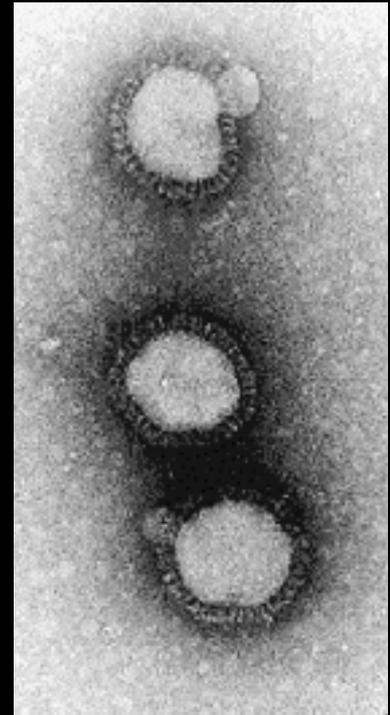
# Influenza

- Essential Terminology
  - Common (seasonal) flu
  - Avian (bird) flu
  - Pandemic flu
  - Virions
  - Virulence



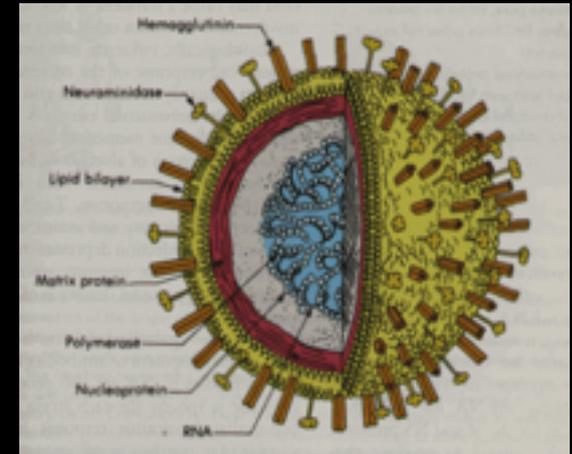
## Types of Influenza Virus

- Orthomyxoviruses
- Three main types
  - Type A—Multiple species
  - Type B—Humans
  - Type C—Humans and swine



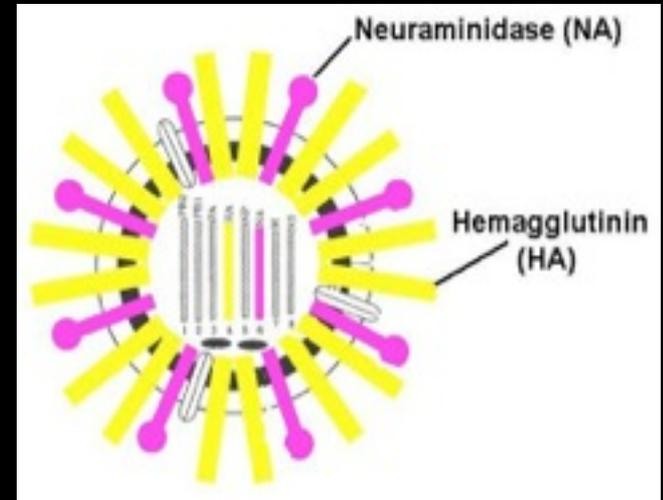
# Influenza Virus A

- Multihost pathogen
  - Humans
  - Avian Influenza
- Most virulent group
- Classification by surface antigens into subtypes
  - Hemagglutinin (H or HA)
  - Neuraminidase (N or NA)



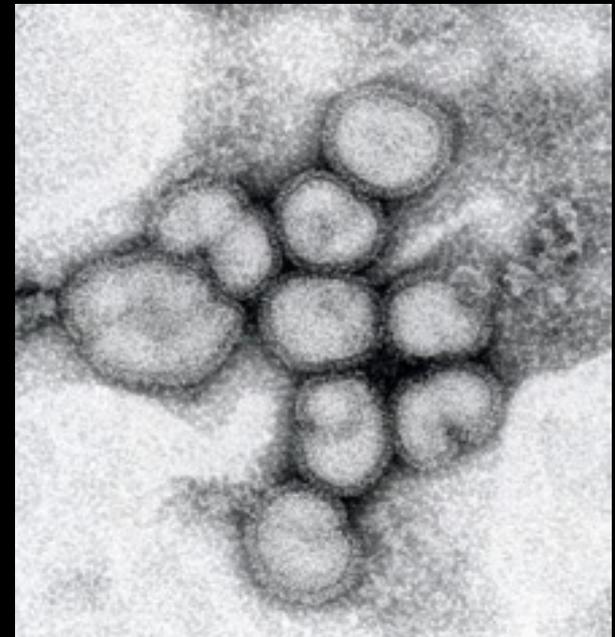
## Influenza Virus A

- Surface antigens and subtypes
  - 15 HA and nine NA
    - All in aquatic birds
  - Hemagglutinin (HA)
    - Sites for attachment to infect host cells
  - Neuraminidase (NA)
    - Remove neuraminic acid from mucin and release from cell



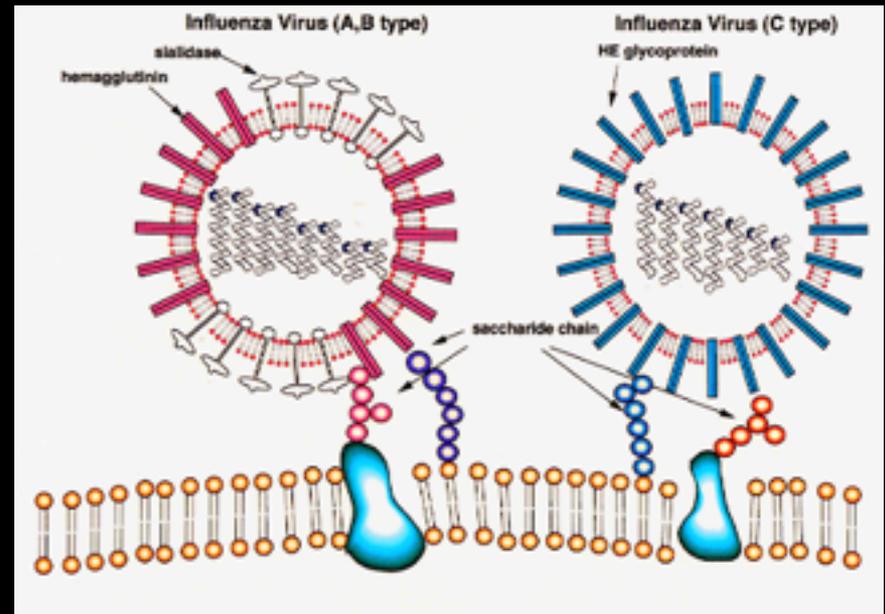
## Influenza Virus B

- Mostly humans
- Common
- Less severe than A
- Epidemics occur less often than A
- Human seasonal vaccine
  - Two strains of type A
  - One strain of type B



## Influenza Virus C

- Humans and swine
- Different pattern of surface proteins
- Rare
- Mild to no symptoms
- By age 15, most have antibodies



## The Flu Virus as a Contagion

- One of the most infectious pathogens
- Transmission: Droplets, aerosol, and contact
- Survive off the host for 48 hours!
- Peak transmission in United States
- Many strains circulating



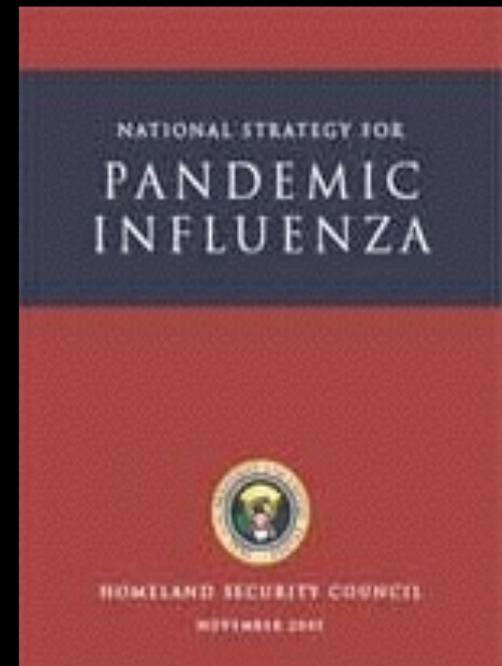
## Seasonal Flu

- An average year—36,000 deaths in US
- Mostly affects people over 65 years old
- Epidemics occur in winter months
- Peaks in hospitalization and death related to influenza occur week five to week 10

# Pandemic Disease

## Old Nemesis or New Threat

- Pandemic disease is not a new threat
- *National Strategy for Pandemic Influenza* (NSPI)—November 2005
- Department of Health and Human Services (HHS) *Pandemic Influenza Plan*—November 2005
- *NSPI* Implementation Plan released by the Homeland Security Council—May 2006



## Endemic, Epidemic, and Pandemic Defined

- *Endemic*—A disease that occurs at a high rate in a given population
- *Epidemic*—An outbreak of new cases of a disease in numbers that exceed what is expected
- *Pandemic*—An epidemic that spreads worldwide



## The Spanish Flu 1918

- Killed more people than any other disease in history
- Caused more deaths than WWI, WWII, the Korean War, and the Vietnam War combined
- Unusually high attack rates among young and otherwise healthy adults (soldiers)



Doughboys - 1918  
[Info.detnews.com](http://Info.detnews.com)

# FLUVIEW



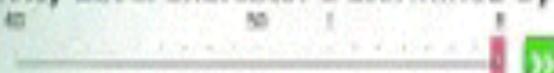
A Weekly Influenza Surveillance Report Prepared by the Influenza Division  
Influenza-Like Illness (ILI) Activity Level Indicator Determined by Data Reported to ILINet

Season: 2012-13

Play

Pause

Previous



Next

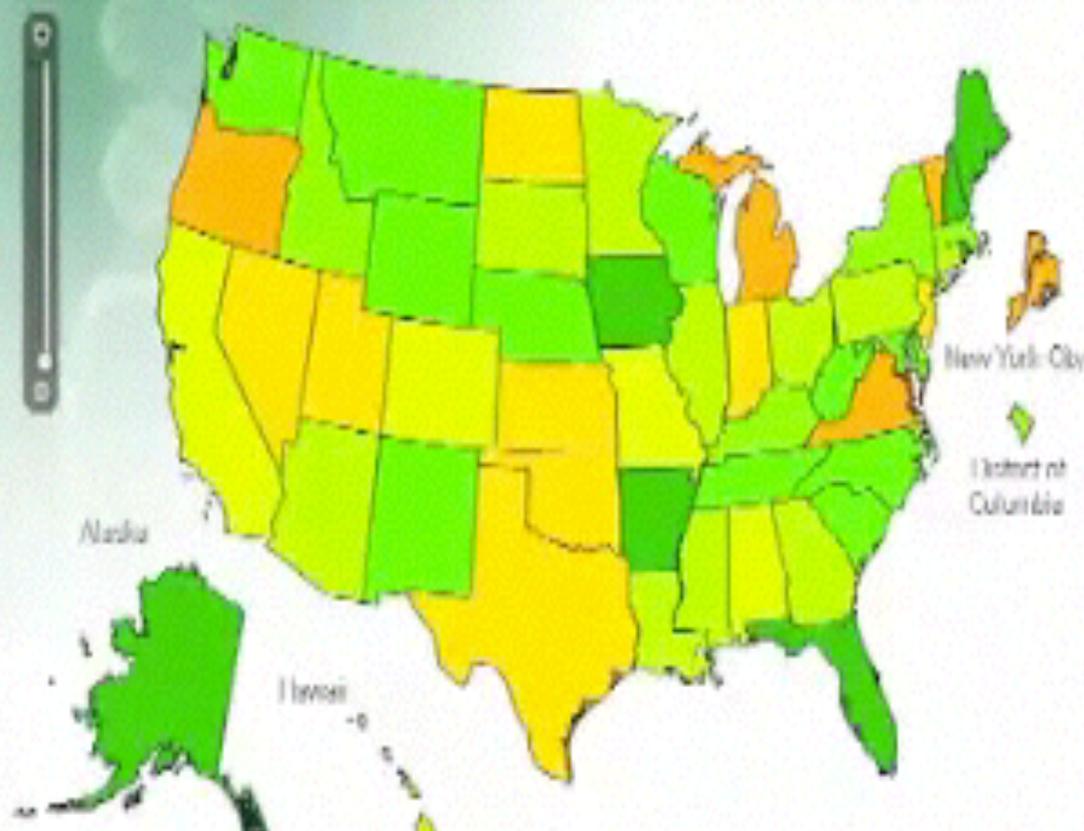
Download Image

Download Data

Print

Advanced View

2012-13 Influenza Season Week 8 ending Feb 23, 2013

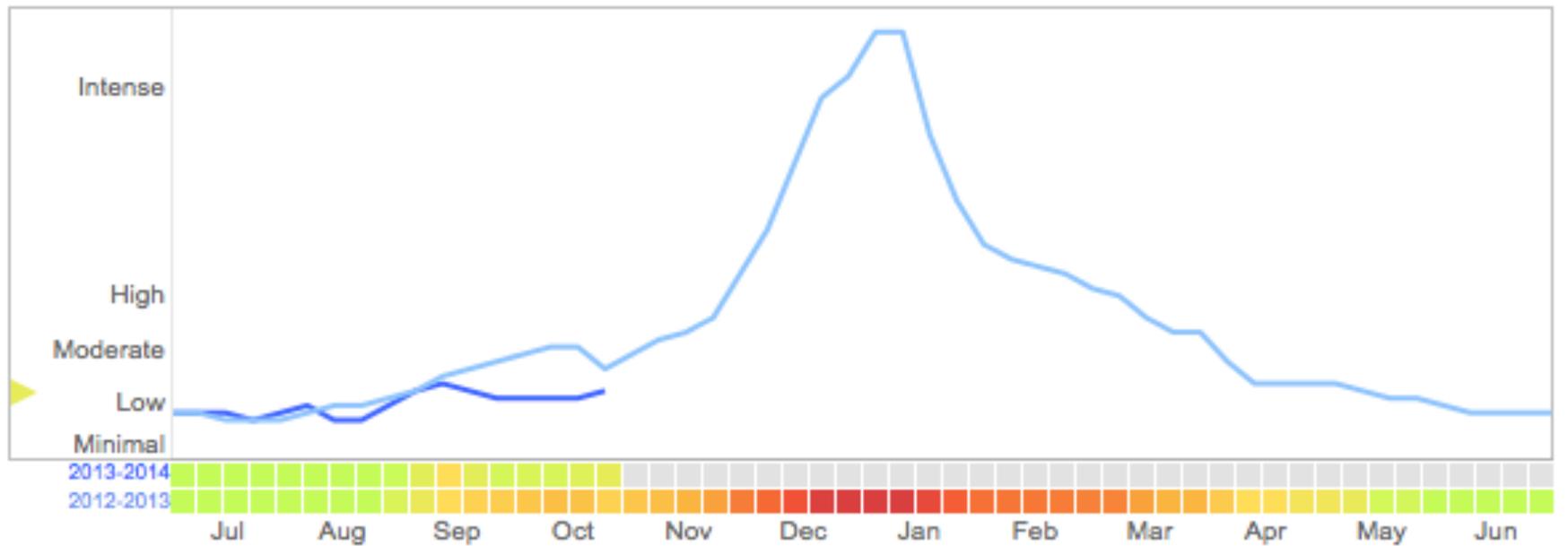


ILI Activity Level



# United States > Virginia

● 2013-2014 ● 2012-2013 ▼

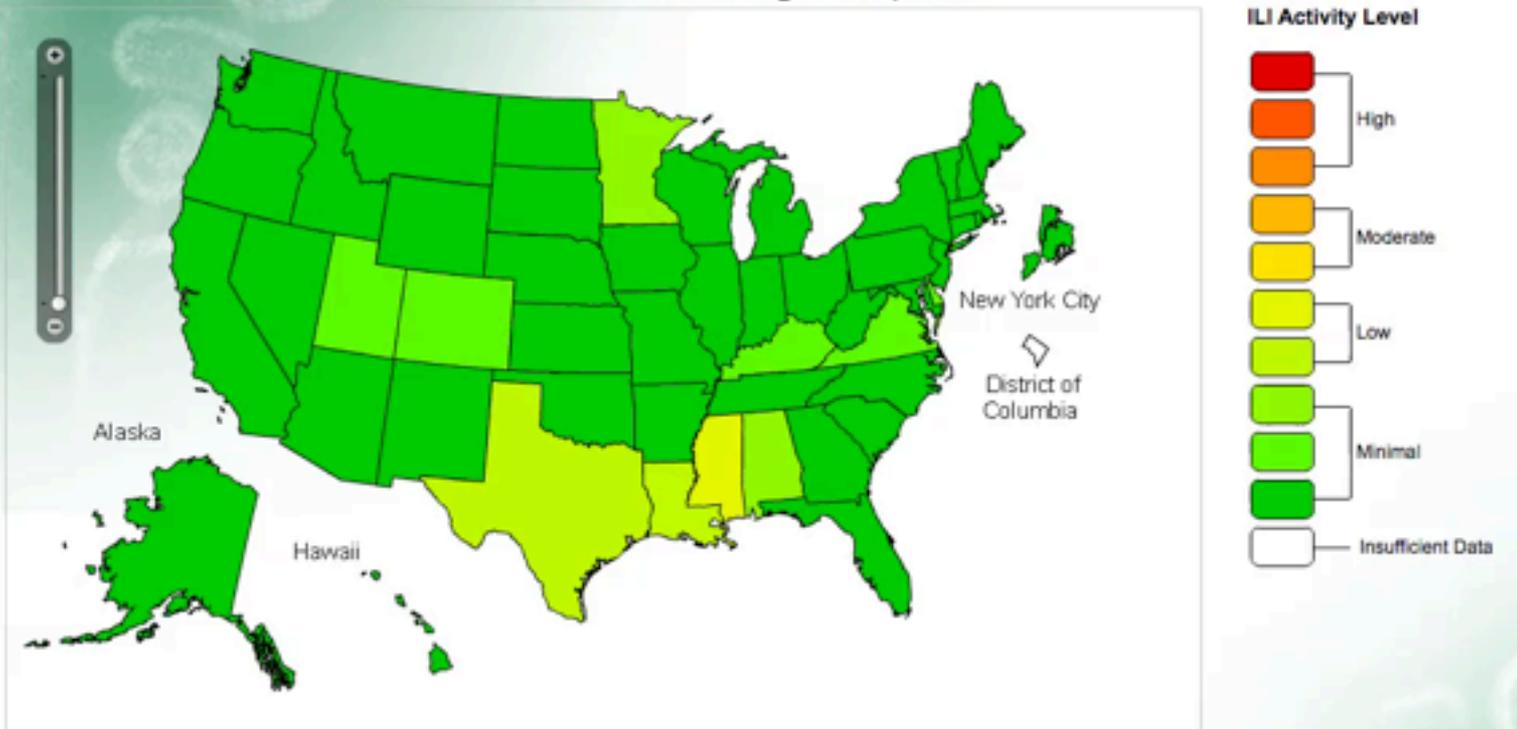


# FLUVIEW

A Weekly Influenza Surveillance Report Prepared by the Influenza Division  
**Influenza-Like Illness (ILI) Activity Level Indicator Determined by Data Reported to ILINet**

Season: 2013-14 [Play](#) [Pau...](#) [◀](#) 40 41 42 43 [▶](#) [Download Image](#) [Download Data](#)

2013-14 Influenza Season Week 43 ending Oct 26, 2013



# Impact on Life in America



*Seattle Daily Times Archives*  
[seattletimes.nwsources.com](http://seattletimes.nwsources.com)



Emergency hospital, Camp Funston, Kansas 1918

Courtesy of National Museum of Health and Medicine

Camp Funston, Kansas Emergency Hospital  
Courtesy of National Museum of Health and  
Medicine

# Impact on Life in America



Iowa State gymnasium, converted into hospital,  
1918 flu epidemic

Iowa State Gymnasium Tent Hospital

Coughs and Sneezes  
Spread Diseases



As Dangerous as Poison Gas Shells  
SPREAD OF SPANISH INFLUENZA  
MENACES OUR WAR PRODUCTION

U. S. Public Health Service Begins Na-  
tion-wide Health Campaign.

Wartime Poster 1918

Courtesy of National Museum of Health and Medicine

## Factors Causing Pandemics

- Rate of transmission
- Severity of the illness—  
Some diseases kill so rapidly that there is minimal opportunity for the spread of the disease (Ebola)
- Overall health of a population
- Ease of travel



Birds to Live Market  
[www.swissinfo.org](http://www.swissinfo.org)

## Conditions Favoring a Pandemic

- A new Influenza A virus arising from a major genetic change (i.e., an antigenic shift)
- A susceptible population with little or no immunity
- A virus that is transmitted efficiently from person to person
- A virulent virus with the capacity to cause serious illness and death

## Swine Flu 1976

- Initial cases suggested possible re-emergence of the 1918 virus
- Nationwide immunization program initiated
- 2008



1976 Swine Flu Vaccine Program  
<http://assets.families.com>

## Swine Flu 1976

- 40 million Americans were vaccinated before the program was discontinued because of deaths and illness attributed to the vaccine
- No other reported deaths from the Swine Flu itself



President Ford—1976  
[www.semp.us](http://www.semp.us)

## Causes of Death

- In a typical flu season, and during the lesser pandemics, most deaths are due to secondary bacterial pneumonias
- In the 1918 pandemic, many deaths were due to an exceptionally lethal primary viral pneumonia



Pneumonia  
[www.mevis.de](http://www.mevis.de)

# Status of Infectious Diseases

- Antibiotic development
- Critical care advances
- Surveillance
- Detection
- Diagnosis



Advanced Critical Care  
[med.stanford.edu](http://med.stanford.edu)

# Emerging Diseases

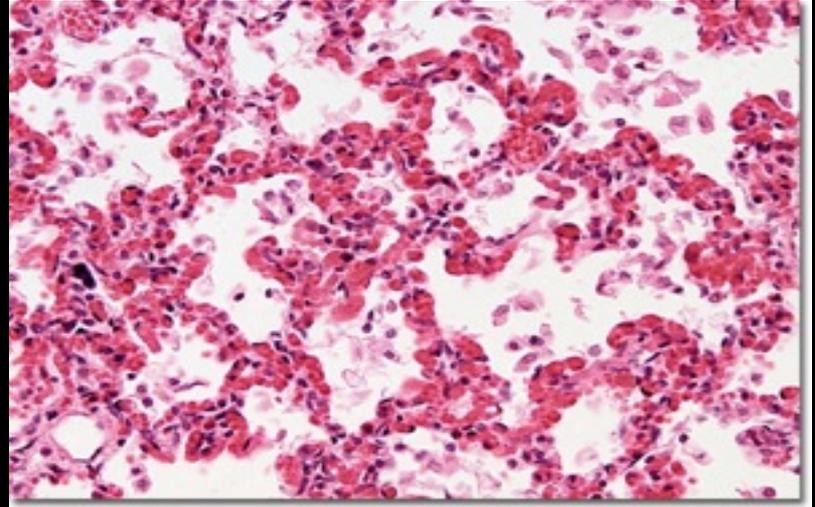
- Legionnaires' Disease—1976
- HIV/AIDS—1978
- Antibiotic-resistant TB
- Nipah Virus—1997
- SARS—2003
- MERS - 2013



[www.peterkuper.com](http://www.peterkuper.com)

# Influenza Mortality

- Treatment of the rapidly progressive severe viral pneumonia is still suboptimal
- Mortality rates from influenza seem to be rising



Bacterial Pneumonia  
[www.microscopy.com](http://www.microscopy.com)

## Influenza Mortality

- Growing numbers of cancer survivors on drugs with immunosuppressant properties
- 40 million persons living with HIV/AIDS
- Millions on various steroids that suppress the immune system



Cancer Survivors  
[www.greenville.k12.sc.us](http://www.greenville.k12.sc.us)

# World Population Travel Patterns



Travel in 1918  
[info.detnews.com](http://info.detnews.com)



Travel Today  
[www.century-of-flight.freeola.com](http://www.century-of-flight.freeola.com)

## Possibility / Probability

- World Health Organization (WHO) assures us that there will be another pandemic
- Unknown when, what, how severe
- Difficulty preparing for these unknowns
- Comparison to bioterrorism threat and planning



WHO Logo  
[www.who.int.org](http://www.who.int.org)

# Medical Response Capability

- United States hospital capacities decreasing
- United States Intensive Care Unit (ICU) beds decreasing
- Insufficient numbers of mechanical ventilators
- Staffing shortages
- Minimal surge capacity



Hospital Ward  
[www.i-freed.org](http://www.i-freed.org)

# Pharmacology

- Seasonal Flu Vaccine
  - H's and N's
  - A and B
- Antiviral Treatment
  - TamiFlu
  - Resistance?

# Non-Pharm

- Hand Hygiene
- Respiratory Etiquette
- Protective Equipment
- Appropriate Social Distancing

# Workforce?

Only 48% report they would be willing to come to work during a SARS outbreak

Columbia University, Mailman School of Public Health,  
2005.

# **I won't spread flu to my patients or my family.**

**Even healthy people  
can get the flu, and  
it can be serious.**

**Everyone 6 months  
and older should  
get a flu vaccine.  
This means you.**

**This season, protect  
yourself—and those  
around you—by  
getting a flu vaccine.**

For more information, visit: <http://www.flu.gov>



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention





# Understanding Flu and Biologic Events

## VDH 2013 EMS Symposium

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