

# 2009 H1N1

Overview of a Pandemic  
April 2009 – August 2010

: National Center for



# Outline

- Background on Influenza
- Tracking Influenza
- Preparing for a Pandemic
- Detection of the 2009 H1N1 Virus
- Impact of 2009 H1N1
- 2009 H1N1 Accomplishments
- What You Can Do
- Resources

# Background on Influenza

# What is Influenza?

- Influenza (the flu) is a contagious respiratory illness caused by influenza viruses. It can cause mild to severe illness, and at times can lead to death

# What are the Symptoms of Influenza?

Symptoms of influenza include the following:

- Fever\* or feeling feverish/chills
- Cough
- Sore throat
- Runny or stuffy nose
- Muscle or body aches
- Headaches
- Fatigue (tiredness)
- Some people may have vomiting and diarrhea, though this is more common in children than adults.

*\* It's important to note that not everyone with flu will have a fever*

# How Influenza Spreads

- People with flu can spread it to others up to about 6 feet away
- Most experts think that flu viruses are spread mainly by droplets made when people with flu cough, sneeze or talk
- These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs. (large droplet transmission, small particle droplet nuclei)
- Less often, a person might also get flu by touching a surface or object that has flu virus on it and then touching their own mouth or nose (contact transmission)

# Influenza Incubation Period

- 1- 7 days (typically 2-3 days)
- Viral shedding can begin 1 day before illness onset
- This means that people can be contagious to others from the day before illness
- Most people will shed virus and possibly able to spread flu to others for 5-7 days

# What is the Impact of Seasonal Influenza in the United States?

- Flu seasons vary substantially from year to year
- Difficult to predict severity or timing
- 5% - 20% of U.S. population infected
  - Highest illness rates in children
  - Highest complication rates in elderly
- Annual estimated flu-associated deaths from 1976-2007 ranged from a low of about 3,000 deaths (1986-1987 season) to nearly 49,000 deaths (2003-2004 season)<sup>1</sup>
- About 90% of deaths occur among people 65 years of age and older<sup>2</sup>
- Annual average of 220,000 hospitalizations - about 50% in 65 and older<sup>3</sup>
- Influenza results in substantial economic impact. Estimated at ~\$37.5 billion<sup>4</sup>

**1, 2, CDC. Estimates of deaths associated with seasonal influenza ---**



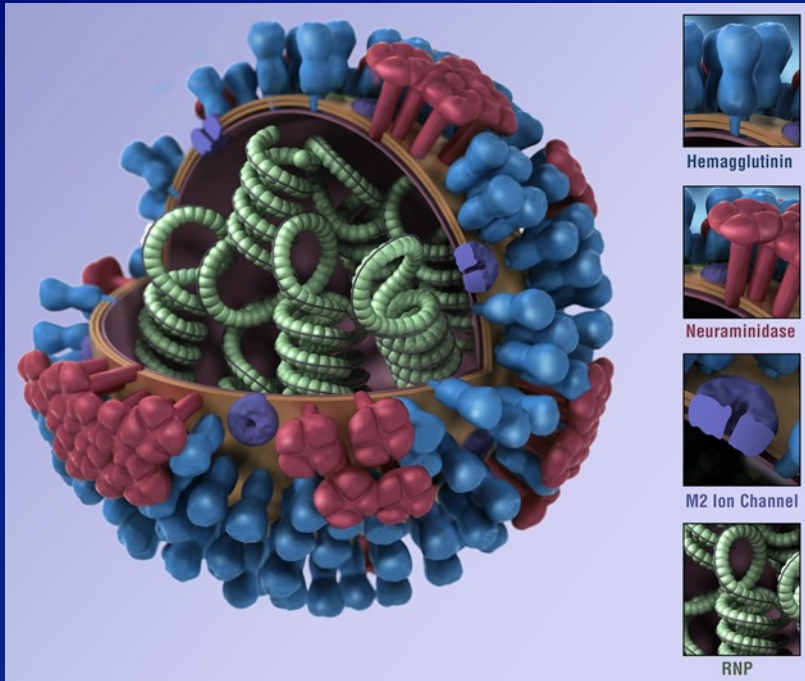
# Groups at Increased Risk of Severe Influenza

- Children younger than 5, but especially children younger than 2 years old
- Adults 65 years of age and older
- Pregnant women
- Last flu season, American Indians and Alaskan Natives seemed to be at higher risk of flu complications
- People who have medical conditions including:
  - Asthma
  - Neurological and neurodevelopmental conditions [including disorders of the brain, spinal cord, peripheral nerve, and muscle such as cerebral palsy, epilepsy (seizure disorders), stroke, intellectual disability (mental retardation), moderate to severe developmental delay, muscular dystrophy, or spinal cord injury].
  - Chronic lung disease (such as chronic obstructive pulmonary disease [COPD] and cystic fibrosis)
  - Heart disease (such as congenital heart disease, congestive heart failure and coronary artery disease)
  - Blood disorders (such as sickle cell disease)
  - Endocrine disorders (such as diabetes mellitus)
  - Kidney disorders

# Influenza Viruses

- There are three main types of influenza (flu) virus: Types A, B and C
- Human influenza A and B viruses cause seasonal epidemics of disease almost every winter in the United States
- Influenza type C infections cause a mild respiratory illness and are not thought to cause epidemics
- Influenza A viruses are divided into subtypes based on two proteins on the surface of the virus: the hemagglutinin (H) and the neuraminidase (N)
- Influenza B viruses are not divided into subtypes. Influenza B viruses also can be further broken down into different strains

# Key Influenza Viral Features



## Surface proteins (major antigens)

### Hemagglutinin (HA)

- HA attaches virus to host cells
- Antibody to HA is protective

### Neuraminidase (NA)

- Helps release virions from cells
- Antibody to NA can help modify disease severity

### M2 Ion Channel

- Proton-selective ion channel
- Lowers the pH inside of the virus resulting in dissociation of the RNPs

# Influenza Viruses

- Current subtypes of influenza A viruses found in people are influenza A (H1N1) and influenza A (H3N2) viruses
- Influenza A (H3N2) viruses cause the greatest morbidity, mortality
- Influenza A (H1N1), A (H3N2), and influenza B viruses are included in

# Influenza: An Ever-Changing Virus

- Influenza (flu) viruses can change in two different ways: antigenic drift and antigenic shift

## Antigenic drift:

- Refers to small changes in influenza viruses that happen continually over time
- Is one of the main reasons why people can get the flu more than one time
  - A person infected with a particular flu virus strain develops antibody against that virus. As newer virus strains appear, the antibodies against the older strains no longer recognize the "newer" virus, and re-infection can occur
- In most years, one or two of the three virus strains in the influenza vaccine are updated to keep up with the changes in the circulating flu viruses

# Influenza: An Ever-Changing Virus

- The other way influenza viruses change is through “antigenic shift”

## Antigenic shift:

- Is an abrupt, major change in the influenza A viruses
- Results in a new influenza A subtype or a virus with a hemagglutinin or a hemagglutinin and neuraminidase combination that has emerged from an animal population that is so different from the same subtype in humans that most people do not have immunity to the new (e.g. novel) virus
- An example of a “shift” occurred in the spring of 2009, when a new H1N1 virus with a new combination of genes (from American pigs, Eurasian pigs, birds and humans) emerged in people and quickly spread, causing a pandemic

# Tracking Influenza

# Why do we want to track influenza?

- Characterize circulating viruses
- Determine where influenza is spreading
- Determine to whom influenza is spreading
- Describe those at risk of severe disease
- Describe the spectrum of clinical illness



# Key Indicators

Influenza activity is monitored by various approaches, primarily with key indicators:

- Virus characteristics
- Geographic spread
- Outpatient illness reports
- Hospitalizations
- Deaths

# Virus Surveillance

## Reports from surveillance partners in clinical settings

- Participants in the National Respiratory and Enteric Viruses Surveillance System (NREVSS)
- Generally indicate if influenza A or B

Reports from Public Health Labs participating in CDC's part of the WHO Global Influenza Surveillance Network. These laboratories report on type and subtype:

# Virus Surveillance

- CDC supports 95 U.S. public health and reference laboratories with staff, equipment, and reagents
- CDC maintains an “Influenza Reagent Resource” to manufacture and distribute test reagents for U.S. and over 140 countries
- System monitors for antiviral resistance, genetic mutations, and for vaccine match

# Disease Surveillance

## Disease surveillance monitors:

- Geographic spread of disease in the community
- Where and when the flu is showing up in clinics and emergency departments
- In hospitals, the severity, clinical illness, and those at risk
- Mortality via death reports

# Summary of the Geographic Spread of Influenza

- State and Territorial Epidemiologists Reports – State health departments report the estimated level of spread of influenza activity in their states each week
- States report influenza activity as no activity, sporadic, local, regional, or widespread

# Outpatient Illness Surveillance

- The Outpatient Influenza-like Illness Surveillance Network (ILINet) consists of more than 3,000 healthcare providers in all 50 states, the District of Columbia and the U.S. Virgin Islands reporting over 25 million patient visits each year
- Approximately 1,400 outpatient care sites around the country report weekly data to CDC on the total

# Hospitalization Surveillance – Emerging Infections Program (EIP)

- The EIP Influenza Project conducts surveillance for laboratory-confirmed influenza related hospitalizations in children and adults in 60 counties covering 12 metropolitan areas of 10 states (San Francisco CA, Denver CO, New Haven CT, Atlanta GA, Baltimore MD, Minneapolis/St. Paul MN, Albuquerque NM, Las Cruces, NM, Albany NY, Rochester NY, Portland OR, and Nashville TN)
- Cases are identified by reviewing hospital laboratory and admission databases and infection control logs for children and adults with a documented positive influenza test. EIP estimated hospitalization rates are reported every other week during the influenza season, but were reported weekly during the 2009 H1N1 pandemic

# Mortality Surveillance

- 122 Cities Mortality Reporting System Information on patient visits to health care providers for influenza-like illness is collected through the US Outpatient Influenza-like Illness Surveillance Network (ILINet)
- Surveillance for Influenza-associated Pediatric Mortality Influenza-associated deaths in children



# Preparing for a Pandemic

# Preparing for a Pandemic

- Pandemics are sporadic, unpredictable
- Caused by novel influenza A viruses
- Spread from person to person and cause human illness

▪ Most of the population is susceptible

# Preparing for a Pandemic

Three conditions must be met for a pandemic to start:

1. A new influenza virus subtype must emerge for which there is little or no human immunity;
2. It must infect humans and causes illness; and
3. It must spread easily and

# Preparing for a Pandemic

## Assumptions

- The threat of an avian influenza A (H5N1) pandemic shaped some assumptions
  - pandemic virus would likely emerge in birds, not swine
  - pandemic virus would likely emerge in Southeast Asia, not North America
- Planned for a worst case scenario – Severity of 1918, not 1968
- Planning for a severe pandemic provided opportunities

# Actions for Diagnostic Preparedness

1. Develop New Diagnostic Tests and Improved Diagnostic Capabilities
2. Improve Surge Capacity
3. Implement Proficiency Testing
4. Increase Laboratory Training
5. Develop Policy and Regulatory Preparedness
6. Improve Access to Viruses and Reagents
7. Provide Guidance for Clinicians
8. Improve Virologic Surveillance
9. Conduct Antiviral Resistance Testing

# Enhanced Laboratory Detection

## Developed New Diagnostic Tests

- 2007 - PCR Test for detecting avian influenza A (H5) viruses on “LightCycler”
- 2008 - PCR Test for detecting A, B, H1, H3, and H5 on “AB 7500”
- 2008 - Experimental Point of Care Test on “Mesoscale Diagnostics” device



# Enhanced Virus Surveillance

- Increased number of labs in US with testing devices, staff, and reagents
- Increased number of specimens being tested

- Developed “Influenza Reagent Resource”



- Contract laboratory to manufacture and distribute PCR reagents during routine seasons

[www.influenzareagentresource.org](http://www.influenzareagentresource.org)

[Fluorder@cdc.gov](mailto:Fluorder@cdc.gov)

- Rapidly makes reagents during a

# Increasing Detection of Swine Influenza

- Increasing numbers of cases of swine influenza being detected *NEJM 2009 Shinde et al.*
  - Due to increased public health laboratory testing
  - Few number of cases
    - 1-2 per year until 2005
    - 11 total from 2006 to Feb 2009
  - Limited transmission among cases
  - Most with some connection to swine exposure
- Increasing efforts among government



# Detection of 2009 H1N1 Virus

# Detection of 2009 H1N1 Virus

- March 2009
  - 2 cases of febrile respiratory illness in children (un-related, no pig contact)
  - Residents of adjacent counties in southern California, ill in late March
- 2009 pandemic influenza A (H1N1) virus testing began at CDC on April 15th
- Both viruses genetically identical
  - Contain a unique combination of gene segments previously not recognized among swine or human influenza viruses in the United States

MMWR

April 24, 2009

## Swine Influenza A (H1N1) Infection in Two Children – Southern California, March–April 2009

*On April 21, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).*

Retrospective evidence of respiratory illness outbreaks in Mexico (February/March)

April 26, 2009

U.S. declares National Public Health Emergency

June 11, 2009

WHO declares Global pandemic of novel influenza A (H1N1) virus

# Novel Swine Influenza Detected

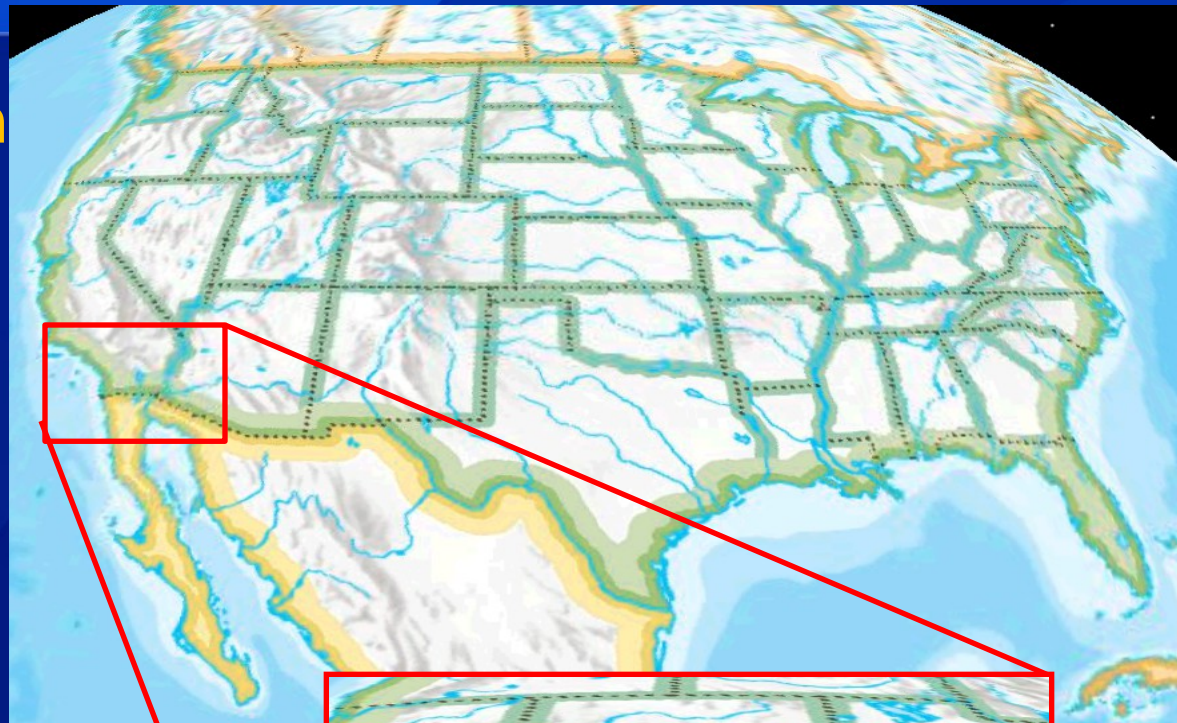
1) April 15, 2009

- 10-year-old boy
- Mild flu symptoms
- Part of CDC study using “Mesoscale” flu test

2) April 17, 2009

- 8-year-old girl
- Mild flu symptoms
- Part of CDC Border Influenza Project

Surveillance showed no other novel flu cases  
No suspect flu cases in hospitals in the region



Southern California, US

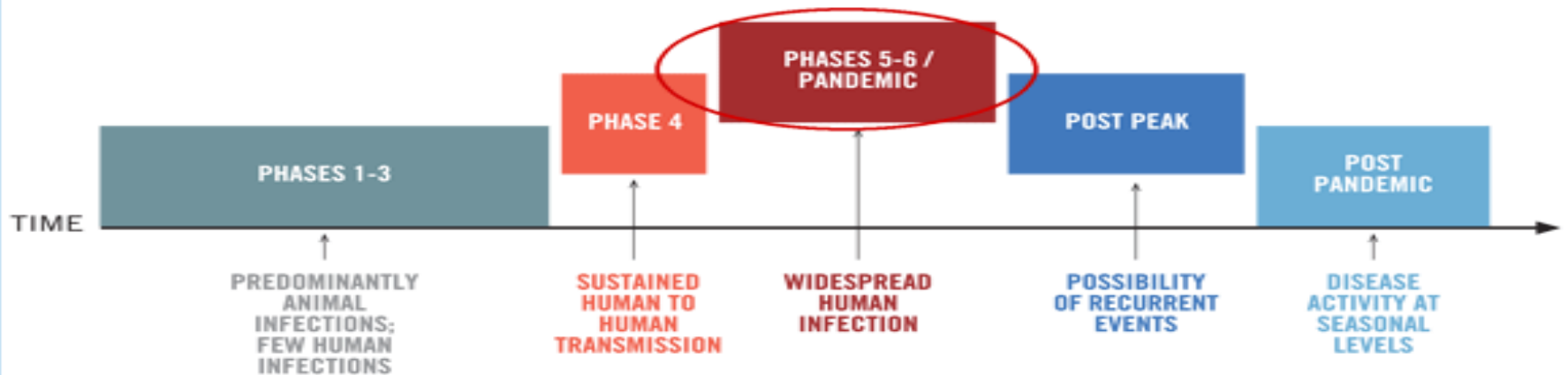
# Novel Swine Influenza Detected

- Both cases reported in MMWR - *MMWR 58(15);400-02*



Contestant at County Fair  
in California

- Posted gene sequences on GenBank
- Searched for swine



**June 11, 2009**

“On the basis of available evidence, and these expert assessments of the evidence, the scientific criteria for an influenza pandemic have been met. I have therefore decided to raise the level of influenza pandemic alert from phase 5 to phase 6. The world is now at the start of the 2009 influenza pandemic.”

- Dr Margaret Chan, Director-General of the World Health Organization

# Surveillance Systems

- As the outbreak investigation expanded, CDC epidemiologists worked with state, local and international partners to enhance CDC's existing flu surveillance systems to better track the spread of 2009 H1N1

# Impact of 2009 H1N1

# Impact of 2009 H1N1 Flu

## Global Impact

- More than 214 countries and overseas territories or communities had reported laboratory confirmed cases of pandemic influenza H1N1 2009, including at least 18,449 deaths (World Health Organization, August 6, 2010)
- Reported cases and deaths are likely a substantial under-estimate of true impact of 2009 H1N1



# Impact of 2009 H1N1 Flu

## Domestic Impact

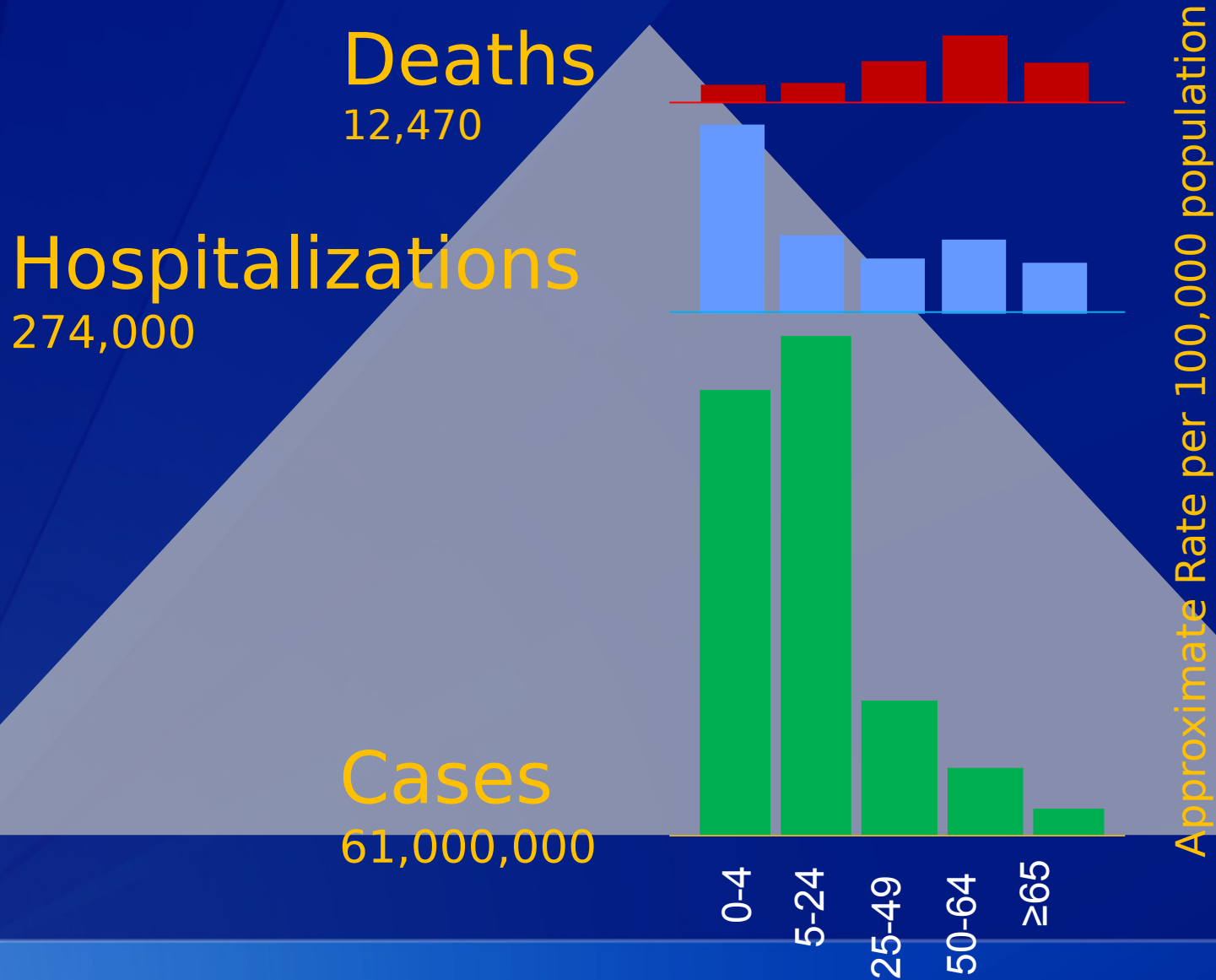
### CDC Estimates of 2009 H1N1 Cases and Related Hospitalizations and Deaths from April 2009-April 10, 2010, By Age Group

Outcome and age group	Mid-level Range	Estimated Range
<b>Illnesses</b>		
0-17 years	20,000,000	14 -28 million
18-64 years	35,000,000	25 - 52 million
65 and older	6,000,000	4 - 9 million
<i>Total illnesses</i>	61,000,000	43 - 89 million
<b>Hospitalizations</b>		
0-17 years	87,000	62 - 128 thousand
18-64 years	160,000	114 - 235 thousand
65 and older	27,000	19 - 40 thousand
<i>Total hospitalizations</i>	274,000	195 - 403 thousand
<b>Deaths</b>		
0-17 years	1,280	910 - 1880
18-64 years	9,570	6,800 – 14,040
65 and older	1,620	1,160 - 2,380
<i>Total deaths</i>	12,470	8,870 - 18,300

[http://www.cdc.gov/h1n1flu/estimates\\_2009\\_h1n1.htm](http://www.cdc.gov/h1n1flu/estimates_2009_h1n1.htm)

# Characteristics of 2009 H1N1 Influenza

## April 15, 2009 to April 10, 2010



# Groups at Increased Risk of Severe Influenza (2009 H1N1)

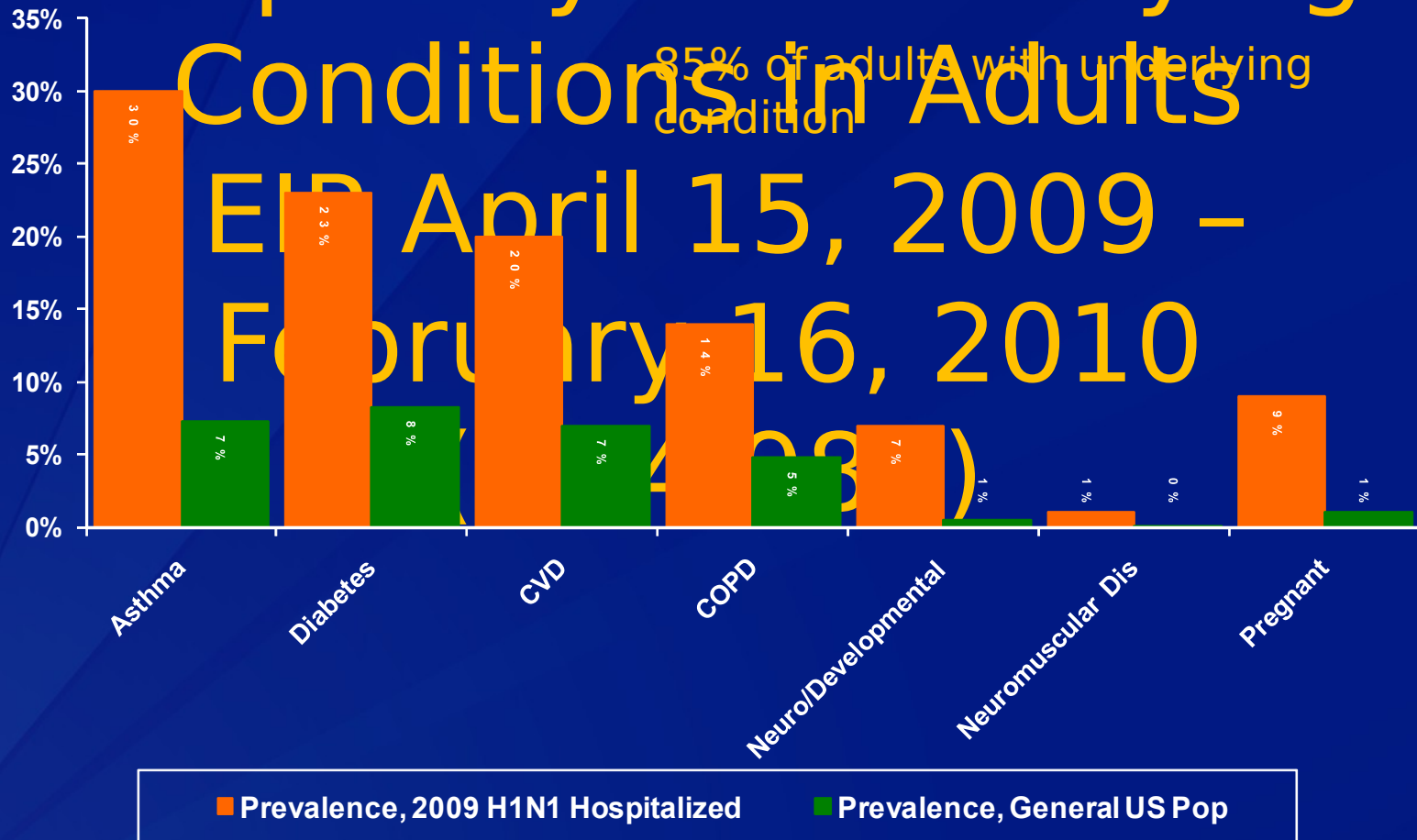
## Most impacted populations

- Children, young adults
- Persons with underlying chronic medical conditions (e.g. chronic lung disease, heart disease, immunosuppression, neurological and neurodevelopment diseases)
- Pregnant women
- Indigenous populations

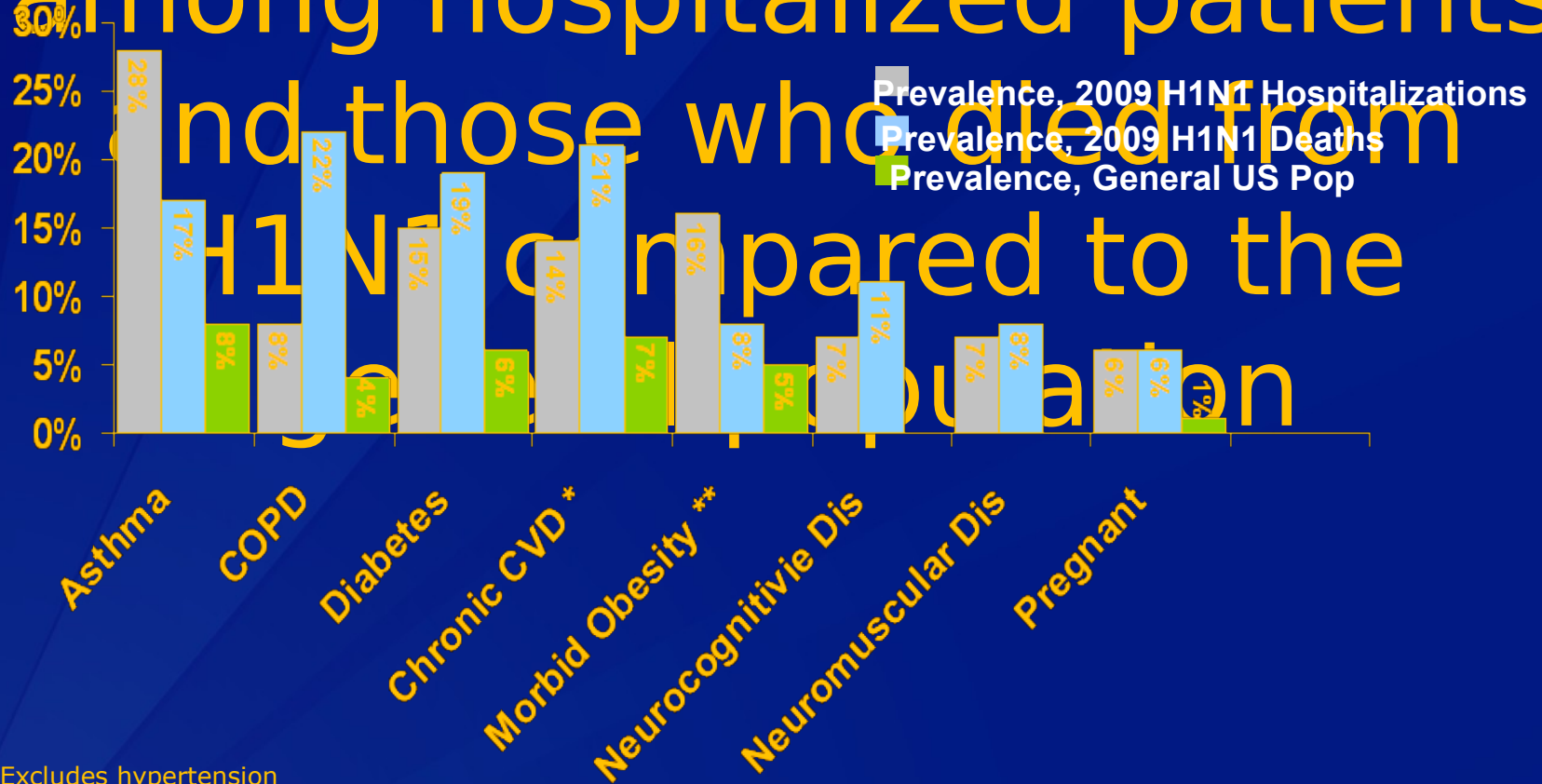
## Possible risk groups

- Obesity (Body Mass Index  $\geq 35$ ),

# 2009 H1N1 Hospitalizations Frequency of Underlying Conditions in Adults



# Underlying conditions among hospitalized patients and those who died from H1N1 compared to the general population



\*Excludes hypertension

\*\* Morbid obesity is defined as BMI of 40 or higher. For Hospitalized H1N1 patients, BMI calculation was performed on non-pregnant adults  $\geq 20$  years ( $n=119$ ). 45% of 119 non-pregnant hospitalized adults  $\geq 20$  years were missing height and weight information. For Novel H1N1 Deaths, morbid obesity % was calculated for adults only. Prevalence for US non-pregnant adults is based on NHANES (JAMA. 2006;295(13):1577)

Source O Morgan, et al.

# Obesity: a New Risk Factor for Severe Illness due to 2009 H1N1

- Disproportionate number of obese, particularly morbidly obese, among severely ill during 2009 H1N1 pandemic
- Morbid obesity (BMI $\geq$ 40) was associated with hospitalization, and possibly death, due to 2009 H1N1 infection among adults without chronic medical conditions

Morgan OW, Brantley A, et al (2010)

PLoS ONE 5(3): e9694. doi:10.1371/journal.pone.0009694

- Additional studies with larger sample

# Age-adjusted and Season-specific 2009 H1N1

Race/Ethnicity	Influenza Season	
	2009	2009-10
White, non-Hispanic	3.0	16.3
Black, non-Hispanic	10.9	29.7
Hispanic	8.2	30.7
Asian/Pacific Islander	8.1	12.5
American Indian/Alaska Native	4.1	32.7

Program, 2009-10

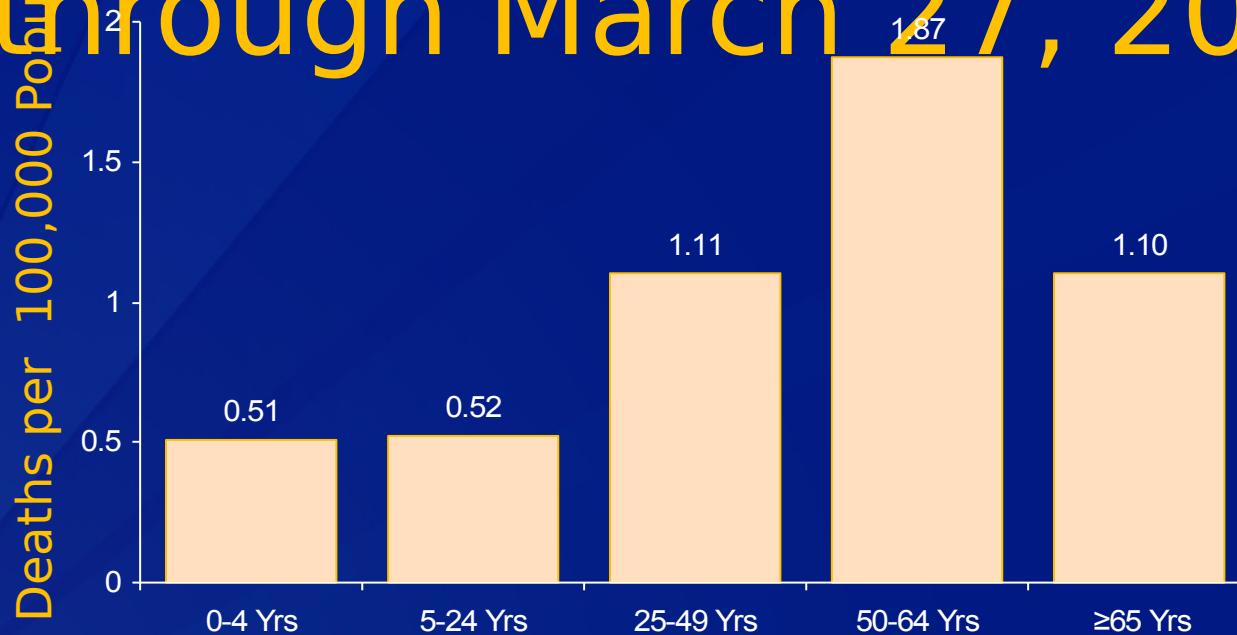
2009: April 15 - August 31, 2009

2009-10: September 1, 2009 - January 26, 2010

# 2009 H1N1 Cumulative Lab-Confirmed Death Rate, by Age Group

Cumulative Lab-Confirmed Death Rate by Age Group (n=2,589)

## through March 27, 2010





# 2009 H1N1 Accomplishments

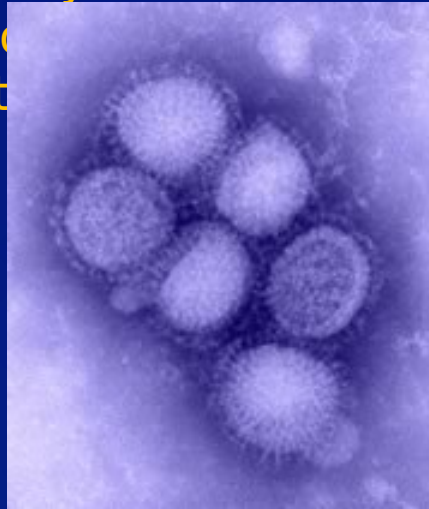
# 2009 H1N1 Accomplishments

- CDC's Influenza Division laboratories in Atlanta were the first in the world to identify the new 2009 H1N1 virus strain



# 2009 H1N1 Accomplishments

- The new 2009 H1N1 virus was originally referred to as “swine flu” because initial laboratory tests at CDC showed that six of the virus’s eight genes were most closely related to influenza viruses that normally occur in pigs in North America and the remaining two genes were most closely related to influenza viruses circulating in Eurasian pigs



- CDC uploaded the complete gene sequences of the 2009 H1N1 Virus to

# 2009 H1N1 Accomplishments

- CDC's subject matter experts worked around the clock to create guidance documents for the general public, business, schools, child care programs, at-risk populations, clinicians, travelers, laboratory specialists, etc

- Many of these documents were revised several times as the outbreak developed and as new information

The screenshot displays the CDC website's H1N1 Flu section. At the top, the CDC logo and name are visible, along with a search bar. Below the navigation menu, the main heading is "H1N1 Flu Clinical and Public Health Guidance". The page is organized into several columns:

- Left Column:** A vertical menu with "H1N1 Flu" highlighted, containing sub-links for General Info, Info for Specific Groups, Guidance, Vaccine, Treatment (Antivirals), Diagnosis, Infection Control, Situation Update, Press Updates, Reports & Publications, Travel, Emergency Use Authorization, Tools, Audio & Video, Images, Related Links, Social Media, and What's New.
- Center Column:** The main content area titled "H1N1 Flu Clinical and Public Health Guidance". It includes sections for:
  - Vaccination Guidance for State, Local, Tribal and Territorial Health Officials:** Lists "Information for Vaccine Planners" (Nov 20) and a "Template Letter for Healthcare Providers about the Vaccine Adverse Event Reporting System (VAERS)" (Oct 12).
  - Epidemiology and Surveillance:** Lists "Interim Recommendations for Clinical Use of Influenza Diagnostic Tests During the 2009-10 Influenza Season" (Sep 29), "Interim Guidance for Influenza Surveillance: Prioritizing RT-PCR Testing in Laboratories" (Oct 9), and "Interim Guidance for Reporting Influenza-Associated Hospitalizations and Deaths" (Sep 8).
  - Clinician Guidance:** Lists "Interim Recommendations for Clinical Use of Influenza Diagnostic Tests During the 2009-10 Influenza Season" (Sep 29), "Antiviral Recommendations" (Dec 7), "Intravenous Peramivir" (Oct 26), "Pediatric Supplement Recommendations" (Dec 2), and "Updated Interim Recommendations for Obstetric Health Care Providers Related to Use of Antiviral Medications in the Treatment and Prevention of Influenza for the 2009-2010 Season" (Oct 23).
- Right Column:** Includes a "Text size" selector (S, M, L, XL), social media links (Email page, Print page, Bookmark and share, RSS, Twitter, Podcasts), a "View page in" section (Español), an email update subscription form, and "Contact Us" information for the CDC.

# 2009 H1N1 Accomplishments

- Once the 2009 H1N1 outbreak was detected, CDC enhanced its existing surveillance systems and added several new surveillance systems to better track the spread, disease characteristics and burden of the new virus

- One of the new surveillance systems was the Aggregate Hospitalizations and Deaths Reporting Activity (AHDRA), which was a Web-based system used to track state reports of

- laboratory-confirmed and syndromic flu-related hospitalizations and deaths. Because experts acknowledged that individual reports of hospitalizations and deaths likely represented an undercount of what was occurring

in

- actuality, CDC also developed a method to estimate 2009 H1N1 cases, hospitalizations and deaths in the United States. The methodology

## Influenza Surveillance: Aggregate Hospitalizations and Deaths Reporting Activity (AHDRA)

April 16, 2010 11:00 AM ET

The **Aggregate Hospitalizations and Deaths Reporting Activity (AHDRA)** is a web-based influenza surveillance system implemented in response to the 2009 H1N1 pandemic that collects voluntary reports of influenza-related hospitalizations and deaths from U.S. states and territories. (This system does not collect reports of individual cases of flu illness, only hospitalizations and deaths.)

The primary goal of state-level reporting of influenza **hospitalizations** and **deaths** is to track the progression of influenza activity within each state and to determine trends (increasing or decreasing).

AHDRA tracks flu-related hospitalizations and deaths, not just those related to 2009 H1N1. State and local health departments do not need to report the type of influenza virus identified for each hospitalization or death. Approximately 44 jurisdictions report to AHDRA on average each week.

State and local health departments can submit influenza-related hospitalization and death reports to AHDRA using a **laboratory-confirmed** case definition or a **syndromic** case definition. (Specific guidance for state and local health departments is available at <http://www.cdc.gov/H1N1flu/hospitalreporting.htm> )

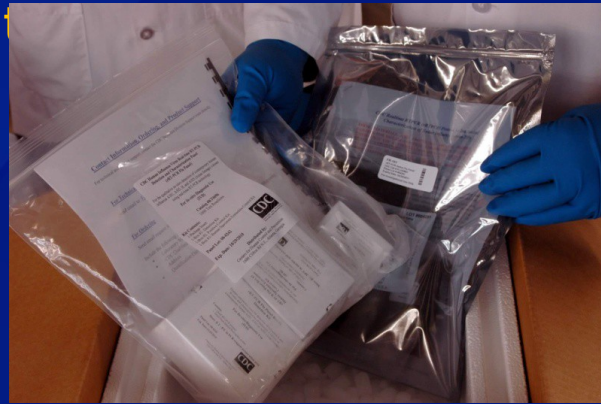
- **Laboratory-confirmed hospitalizations** represent patients who test positive for any type of influenza by a laboratory test, by rapid influenza test, RT-PCR, DFA, or viral culture.
- **Laboratory-confirmed deaths** represent individuals whose deaths have been confirmed by a laboratory test as being associated with influenza.
- **Syndromic hospitalizations** represent patients whose hospitalizations have been clinically identified as being associated with influenza-like illness (ILI) or pneumonia syndrome.
- **Syndromic deaths** represent individuals whose deaths have been clinically-identified as being associated with influenza-like illness (ILI) or pneumonia syndrome.

More information about AHDRA and a summary and interpretation of AHDRA data collected during the 2009 H1N1 pandemic (April 2009 -January 30, 2010) is available at [http://www.cdc.gov/H1N1flu/hosp\\_deaths\\_ahdra.htm](http://www.cdc.gov/H1N1flu/hosp_deaths_ahdra.htm) and will be updated as developments warrant.

Information on the proportion of influenza viruses that are 2009 H1N1 versus seasonal influenza is reported from the virologic surveillance system through FluView (<http://www.cdc.gov/flu/weekly>).

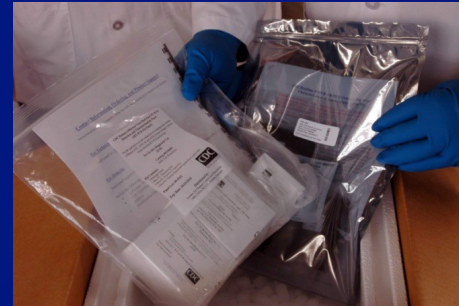
# 2009 H1N1 Accomplishments

- CDC laboratory experts quickly developed primers and probes that could be incorporated into previously manufactured tests to identify the 2009 H1N1 Virus in respiratory (nose, throat and lung) samples collected from patients



- Expedited FDA approval of an emergency use authorization (EUA) for these 2009 H1N1 diagnostic tests occurred on April 28, 2009, less than two weeks after identification of the 2009 H1N1 strain
- On May 1, 2009, CDC test kits began shipping to domestic and international public health laboratories. As of August 2010, 2,344 RT-PCR test kits have been shipped to 442 labs in 145 countries and 305

# 2009 H1N1 Accomplishments



- In response to Secretary of Health and Human Services (HHS) Kathleen Sebelius' declaration of a public health emergency involving 2009 H1N1 flu on April 26, 2009, the FDA authorized the emergency use of important medical products under certain circumstances
- FDA issued EUAs on the five medical products CDC requested, which allowed for the emergency use of antiviral products (Relenza and Tamiflu), certain types/models of N95 respirators, the rRT-PCR Swine Flu Panel diagnostic test, and the rRT-PCR Flu Panel (NPS, NS, TS, NPS/TS, NA) diagnostic test

# 2009 H1N1 Accomplishments

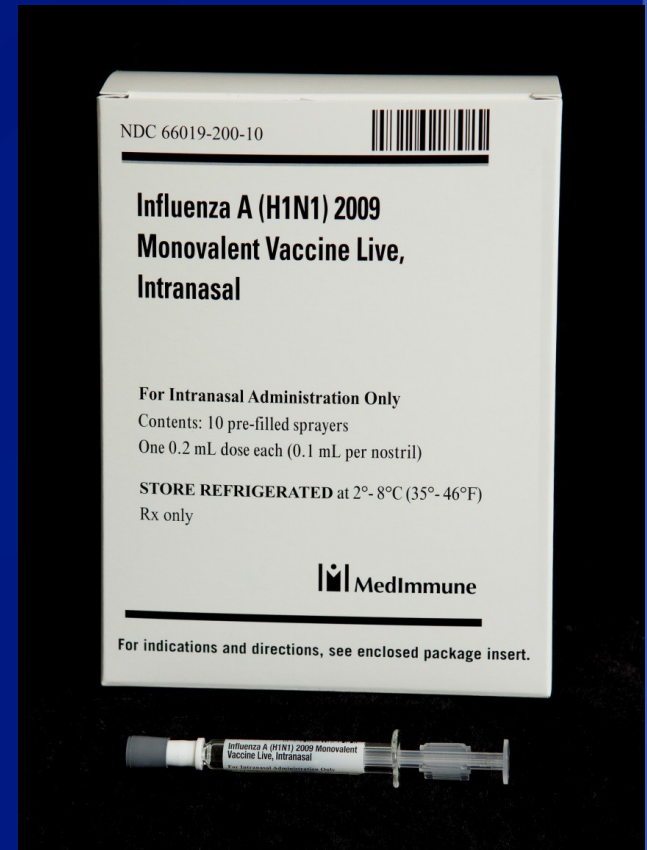
- One of the most important laboratory activities performed at CDC was the selection and development of a candidate vaccine virus for use in the 2009 H1N1 vaccine
- CDC's laboratories took the first step of picking a candidate vaccine virus, which involves choosing a 2009 H1N1 virus that can be grown in mass quantities in chicken eggs
- Once the virus is grown in mass quantities, the parts of the virus that are important for forming an immune response to the vaccine (the virus antigens), are purified to make the vaccine





# 2009 H1N1 Accomplishments

- CDC pursued several scientific methods to create a high-yield vaccine candidate virus for the 2009 H1N1 vaccine, and after consultation with WHO and the Food and Drug Administration (FDA), the A/California/7/2009 virus – a virus isolated at CDC – was chosen to be the vaccine candidate strain for making the 2009 H1N1 vaccine
- After the virus was ready on April 27, 2009, CDC began sending it to vaccine manufacturing companies to begin the process of mass producing a vaccine to protect people against 2009 H1N1
- The 2009 H1N1 vaccine was made using the same egg-based manufacturing process used for making the seasonal flu vaccine.



# 2009 H1N1 Accomplishments

- The vaccine strain grew slowly in chicken eggs, resulting in delays in availability of initial lots of the vaccine. This led to some frustration on the part of the public during the early part of the fall wave of the pandemic, when vaccine supplies were limited



# 2009 H1N1 Accomplishments

- In order to best allocate the initially limited supplies of vaccine, the Advisory Committee on Immunization Practices (ACIP), an independent body of experts that makes vaccine recommendations to CDC, designated target groups to receive the initial doses of the vaccine.



# 2009 H1N1 Accomplishments

## Initial priority groups

- Pregnant women
- Persons who live with or provide care for infants < 6 months (e.g., parents, siblings, and daycare providers)
- Healthcare and emergency medical services personnel
- Persons aged 6 months – 24 years
- Persons aged 25 – 64 years who have medical conditions that put them at higher risk for influenza-related complications

## When vaccine became widely available

Accomplishments -  
p12

- Anyone aged 6 months and older, including

# 2009 H1N1 Accomplishments

- The CDC's distribution system used to supply vaccine to children through the Vaccines for Children Program was modified and enhanced to speed up delivery of the 2009 H1N1 vaccine
- 2009 H1N1 vaccine was sent to more than 70,000 direct-ship-to sites across the United States, and CDC estimates that over 116,000 providers signed agreements to receive vaccine and 10,000 retail pharmacy stores received the 2009 H1N1 influenza vaccine
- As of April 2010, more than of 120 million doses of 2009 H1N1 vaccine had been shipped
- Although each state approached 2009 H1N1 influenza vaccination efforts differently and vaccination rates varied across the United States



# 2009 H1N1 Accomplishments

- Based on data from the Behavioral Risk Factor Surveillance System (BRFSS) and the National 2009 H1N1 Flu Survey (NHFS) combined, as of the end of February 2010, between 72-81 million people reported having been vaccinated against 2009 H1N1 flu
- Preliminary analysis showed vaccination coverage was higher among children than adults and that more than two-thirds of those who received the 2009 H1N1 flu vaccine were in the initial target groups recommended by the ACIP

The screenshot shows the CDC website interface. At the top, it says "CDC Home" and "Centers for Disease Control and Prevention". Below that is a navigation bar with "A-Z Index" and a search box. The main content area is titled "Morbidity and Mortality Weekly Report (MMWR)" and "Interim Results: State-Specific Seasonal Influenza Vaccination Coverage --- United States, August 2009--January 2010". The report is dated "April 30, 2010 / 59(16):477-484". The text of the report discusses the 2009 influenza A (H1N1) pandemic and the vaccination coverage data collected during October 2009--February 2010. It mentions that the distribution of two separate influenza vaccines began, with distinct, although overlapping, recommendations from the Advisory Committee on Immunization Practices (ACIP). The report also notes that CDC used data collected during October 2009--February 2010 from two separate surveys, BRFSS and NHFS, to estimate the cumulative proportion of persons vaccinated with at least 1 dose during August--January by using the Kaplan-Meier survival analysis procedure.

# 2009 H1N1 Accomplishments

Clinical trials of the vaccine conducted by the National Institutes of Health (NIH) found that one dose of 2009 H1N1 vaccine was enough to provide an effective immune response in people 10 years of age and older, and no significant vaccine-related health concerns from the vaccine were reported

The screenshot shows the NIAID website with a news release titled "NIAID Set to Launch Clinical Trials to Test 2009 H1N1 Influenza Vaccine Candidates". The page includes a navigation menu, a search bar, and various utility links. The main content area features the NIH News logo, contact information for Anne A. Oplinger, and a detailed paragraph about the clinical trials. A sidebar on the left lists news releases by year from 2010 to 1995, and another sidebar on the right provides web site tools and social media links.

**National Institute of Allergy and Infectious Diseases**  
Leading research to understand, treat, and prevent infectious, immunologic, and allergic diseases.

**NIAID Home** | **Health & Research A to Z** | **Labs & Scientific Resources** | **Funding** | **About NIAID** | **News & Events**

NIAID > News & Events > News Releases > 2009

**News Releases**

- 2010
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- 1995

By Topic

**NIH News**  
National Institutes of Health

U.S. Department of Health and Human Services  
National Institute of Allergy and Infectious Diseases (NIAID)  
<http://www.niaid.nih.gov>

FOR IMMEDIATE RELEASE  
Wednesday, July 22, 2009

Media Contact:  
Anne A. Oplinger  
(301) 402-1663  
[niaidnews@niaid.nih.gov](mailto:niaidnews@niaid.nih.gov)

**NIAID Set to Launch Clinical Trials to Test 2009 H1N1 Influenza Vaccine Candidates**

Scientists in a network of medical research institutions across the United States are set to begin a series of clinical trials to gather critical data about influenza vaccines, including two candidate H1N1 flu vaccines. The research will be under the direction of the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health.

"With the emergence of the 2009 H1N1 influenza virus, we have undertaken a collaborative and efficient process of vaccine development that is proceeding in stepwise fashion," says NIAID Director Anthony S. Fauci, M.D.

After the isolation and characterization of the virus, the U. S. Centers for Disease Control and Prevention generated and distributed a 2009 H1N1 seed virus to vaccine manufacturers for the development of vaccine pilot lots for testing in clinical trials.

"Now, NIAID will use our longstanding vaccine clinical trials infrastructure—the Vaccine and Treatment Evaluation Units—to help quickly evaluate these pilot lots to determine whether the vaccines are safe and to assess their ability to induce protective immune responses," says Dr. Fauci. "These data will be factored into the decision about how and if to implement a 2009 H1N1 flu immunization program this fall."

**Web site tools**

- E-mail this page
- Print this page
- Get e-mail updates
- Order publications
- Bookmark & share

**NIAID is on Twitter**

**twitter**  
Get a tweet the moment NIAID posts a news release.

**See Also**

- Media Contact Info
- News Releases by Topic
- Health & Research Topics
- Flu Health and Research Information
- Vaccine and Treatment Evaluation Units (VTEU)

# 2009 H1N1 Accomplishments

- CDC and FDA enhanced their ability to monitor the safety of the 2009 H1N1 vaccine and detect any potential problems quickly
- Existing vaccine safety monitoring systems were strengthened and new ones were implemented
- Objectives for Monitoring Vaccine Safety included:
  - Identifying clinically significant adverse events following receipt of 2009 H1N1 vaccine in a timely manner
  - Rapidly evaluating serious adverse events following receipt of 2009 H1N1 vaccine and determining the public health importance
  - Evaluating if there is a risk of Guillain-Barre syndrome (GBS) associated with 2009 H1N1 vaccine and other specified outcomes



# 2009 H1N1 Accomplishments

- The **Vaccine Adverse Event Reporting System (VAERS)** is a voluntary reporting system
- Jointly managed by CDC and FDA
- Identifies potential vaccine safety signs
- National in scope
- Encourages reports from healthcare providers
- Accepts reports from vaccinees and others.
- Medical personnel conduct daily reviews of the information collected.
- For more information, see <http://vaers.hhs.gov>.

The screenshot shows the VAERS (Vaccine Adverse Event Reporting System) website. At the top, the VAERS logo is displayed next to the text "Vaccine Adverse Event Reporting System". A search bar is located in the top right corner. Below the logo, there is a navigation menu with links for "About VAERS", "VAERS Data", "Information for Healthcare Professionals", "Information for U.S. States and Territories", "Vaccine Resources", and "Report an Adverse Event". The main content area is divided into several sections. On the left, there is a text block describing the VAERS program, its purpose, and how it works. In the center, there is a prominent purple box with the heading "Have you or your child had a reaction following vaccination?" and a list of three steps: 1. Contact your health care provider, 2. Report the reaction (with a button), and 3. Visit the National Vaccine Injury Compensation (if appropriate). Below this, there is an "Important note" and a Spanish version of the same information. On the right, there is a photo of a woman and a child, and a "Featured Resources" section with a link to "Summary of 2009 Monovalent H1N1 Influenza Vaccine Data".

**VAERS** Vaccine Adverse Event Reporting System

Search web site:

[About VAERS](#) [VAERS Data](#) [Information for Healthcare Professionals](#) [Information for U.S. States and Territories](#) [Vaccine Resources](#) [Report an Adverse Event](#)

VAERS Data last updated: 04/30/2010

The **Vaccine Adverse Event Reporting System (VAERS)** is a national vaccine safety surveillance program co-sponsored by the Centers for Disease Control and Prevention ([CDC](#)) and the Food and Drug Administration ([FDA](#)). VAERS is a post-marketing safety surveillance program, collecting information about adverse events (possible side effects) that occur after the administration of vaccines licensed for use in the United States.

VAERS provides a nationwide mechanism by which adverse events following immunization may be reported, analyzed, and made available to the public. VAERS also provides a vehicle for disseminating [vaccine safety](#)-related information to parents and guardians, health care providers, vaccine manufacturers, state vaccine programs, and other constituencies. [more...](#)

**Have you or your child had a reaction following vaccination?**

1. Contact your health care provider
2. [Report the reaction](#)
3. Visit the [National Vaccine Injury Compensation](#) (if appropriate)

**Important note:** CDC and FDA do not provide individual medical treatment, advice, or diagnosis. If you need individual medical or health care advice, consult a qualified health care provider.

**¿Ha tenido usted o su hijo una reacción adversa después de recibir una vacuna?**

1. Contacte a su proveedor de salud
2. [Reporte una reacción adversa](#)
3. Visite el [Programa Nacional de Compensación por Daños Derivados de Vacunas](#) (si es necesario)

**Featured Resources**

H1N1 Update

- [Summary of 2009 Monovalent H1N1 Influenza Vaccine Data](#)

# 2009 H1N1 Accomplishments

- VAERS enhancements were made for the 2009 H1N1 vaccines
- Enhancements included an increase in staffing to process VAERS reports more rapidly, and an increase in visibility on professional web sites to encourage reporting
- As of June 3, 2010...
  - About 127 million doses of vaccine had been shipped to vaccine providers in the United States
  - VAERS had received 11,180 adverse event reports
  - Ninety-two percent were reported as “non-serious” and 7.7% were classified as “serious” health events. This proportion is similar to the seasonal influenza vaccination experience
  - One hundred and forty-three reports of Guillian-Barre syndrome (GBS) had been reported. In the United States, an estimated 3,000 to 6,000 people develop GBS each year on average, whether or not they received a vaccination

# 2009 H1N1 Accomplishments

- A new Web-based active surveillance system was also implemented to prospectively follow tens of thousands of vaccinated people. For more information, see [www.myflushot.org](http://www.myflushot.org)
- The vaccine safety data thus far have shown that the 2009 H1N1 vaccine has a safety profile similar to seasonal influenza vaccines



## RTIMS

Real Time Immunization Monitoring System



### Welcome!

Thank you for visiting our website.

With support from the Centers for Disease Control and Prevention (CDC), researchers at the Johns Hopkins School of Public Health developed an internet survey system to help monitor the safety of seasonal and H1N1 influenza vaccines across the United States. Our study was part of surveillance efforts launched by CDC to monitor influenza vaccine safety during the 2009/2010 influenza season.

# 2009 H1N1 Accomplishments

## *Communication During the Pandemic*

- The agency's mission to protect public health was supported by communications founded on emergency risk communications principles of quickly, proactively and transparently communicating accurate information about the situation
- This included clearly stating CDC's goals and actions in response to the evolving situation and acknowledging what was not known as well as what was known. The goal was to inform the public, but to avoid causing unnecessary fear
- From the earliest days of the pandemic, CDC clearly and repeatedly stated its goals to "reduce transmission and illness severity, and to provide information to help health care providers, public health officials and the public address the challenges posed by the new virus."

Be  
First  
Be  
Right  
Be  
Credibl

# 2009 H1N1 Accomplishments

- CDC quickly disseminated information to support those stated goals and dozens of communications tools were used to reach out to audiences across the spectrum, from the public to pharmacists to diagnostics experts to international partners and countries around the globe
- During the early days of the outbreak especially, the release and exchange of information was conducted on a 24-hour cycle and included frequent updates to media and the public, as well as the consistent use of a body of core spokespersons, daily information outreach to partners, and rapid establishment and daily maintenance of extensive Web content related to the emergency response

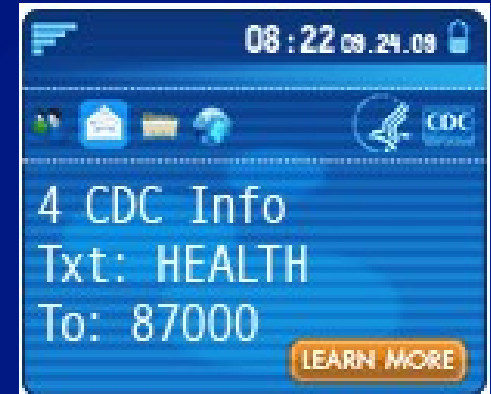


# 2009 H1N1 Accomplishments

- Outlets for outreach included the media, the Internet, health alert networks, outreach through partners and partner organizations, and a 24-hour information hotline, called CDC-INFO

- Throughout the pandemic, CDC-INFO responded to over 212,368 inquiries about 2009 H1N1, including 141,775 general public phone calls, 47,311 general public emails, 23,268 clinician phone calls, and 13 letters

- New methods of outreach were utilized, including video Podcasts, YouTube videos, Facebook postings and Twitter to reach out to people using new and emergent technologies

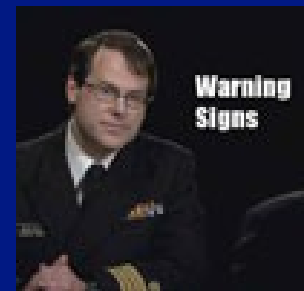
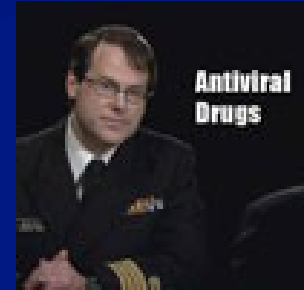


facebook

twitter™

# 2009 H1N1 Accomplishments

- CDC obtained 55,341 Facebook fans during the pandemic
- CDC also shared 2009 H1N1 health information through three Twitter feeds: CDCFlu, CDCEmergency, and CDC\_ehealth
- There are 1,248,719 Twitter followers for the CDC emergency profile, 33,920 Twitter followers for the CDC\_eHealth profile, and 31,338 Twitter followers for the CDCFlu profile
- Video Podcasts and YouTube videos featuring CDC Influenza Division subject matter experts received millions of hits and brought the American public and the rest of the world closer to the science of flu and public health than ever before



# 2009 H1N1 Accomplishments

CDC's 2009 H1N1 influenza website grew from one page to over 200 pages in the first three weeks of the 2009 H1N1 outbreak. The website had received more than 221,388,322 page views since its creation

Key materials and Web pages were translated into multiple languages. For example, the entire English-language 2009 H1N1 site was mirrored in Spanish. In addition, key tools and resources were created in Chinese, Vietnamese, Korean, Japanese, French, German, Arabic, Russian, Amharic, Farsi, Somali, Karen, Burmese, Cambodian and Kirundi

## General Information

- H1N1 Flu & You
- Caring for Someone Sick at Home
- In the News
- Antivirals/Flu Treatment
- CDC Estimates of Cases



[More »](#)

## Vaccination

- General Information
- For Clinicians/Healthcare Professionals
- Vaccine Safety
- Vaccine Supply Status



[More »](#)

## Info for Specific Groups

- Health Care Providers
- State, Local & Tribal Health Officials
- Child Care Programs
- People 65 and Older
- People with Asthma
- Parents & Caregivers
- Pregnant Women
- Travelers & Travel Industry



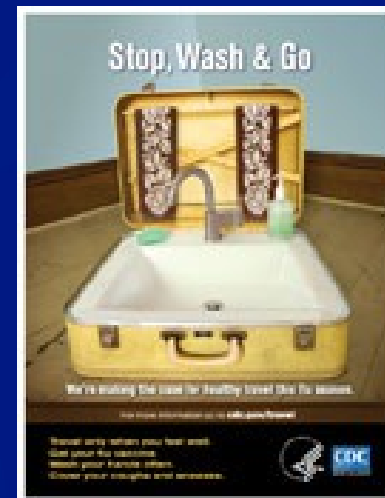
[More »](#)





# 2009 H1N1 Accomplishments

- Key messages were developed internally and distributed daily, and later, weekly, to states, partners and affiliates throughout the outbreak response. The first key messages were distributed on April 19, 2009
- CDC's Division of Global Migration and Quarantine managed and implemented a national Travelers' Health media campaign with messages for healthy travel posted and distributed in over 300 ports of entry to the United States, plus national radio, newspaper and online advertisements with over 80 million exposures



# Where are we now?

- During the 2010-2011 flu season, CDC expects the 2009 H1N1 virus to cause illness again along with other influenza viruses
- The 2010-2011 flu vaccine is expected to protect against 2009 H1N1 (and an H3N2 virus and an influenza B virus)

# What You Can Do

- Take time to get a flu vaccine
- Take everyday preventive actions to stop the spread of germs
- Take flu antiviral drugs if your doctor prescribes them

<http://www.cdc.gov/flu/protect/preventing.htm>

# Resources

- <http://www.flu.gov/>
- <http://www.cdc.gov/flu/>
- <http://www.cdc.gov/h1n1flu/>
- <http://www.who.int/csr/disease/swin>