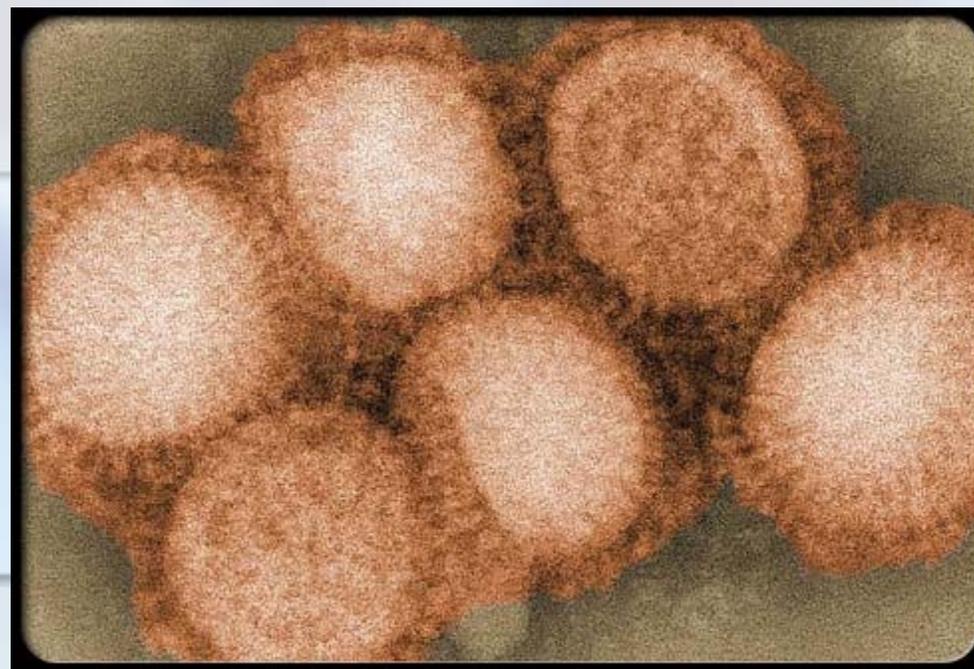


# National Association of State EMS Officials



## What Is All the Fuss?



A "Just-in-Time" Primer on H1N1 Influenza A and Pandemic Influenza  
provided by the National Association of State EMS Officials

May 1, 2009



# Disclaimer

- This self-learning module was developed by the National Association of State EMS Officials. The content was collated and verified as current on May 1, 2009 from various sources (which have been identified.) Users are encouraged to review situational reports and updates from the Centers for Disease Control and Prevention, the US Department of Health and Human Services, the US Department of Agriculture, the World Health Organization, and similar entities as additional information becomes available. NASEMSO did not review or approve material which may have been added beyond the distributed version which is on our web site at [www.nasemso.org](http://www.nasemso.org) .



# Incidence of Seasonal Influenza

- Seasonal influenza results in 200,000 hospitalizations annually in the United States.
- Seasonal influenza causes 30 to 40 thousand deaths each year in the US, ranking it among the nation's top 10 causes of death.
- Influenza related deaths are usually due to secondary pneumonias, exacerbated cardiopulmonary conditions, or other chronic diseases.



# Populations Most Seriously Affected by Seasonal Influenza

- Rates of serious illness and death as a result of the flu are greatest
  - among people aged 65 and older.
  - children under the age of two.
  - those with underlying chronic medical conditions (e.g., diabetes mellitus; chronic lung, liver, kidney & heart disease; HIV infection; and cancer).



# Economic Impact of Seasonal Influenza

- Seasonal influenza's total economic burden is estimated at \$87.1 billion (2003 dollars).
- Direct medical costs total \$10.4 billion, which includes 3.1 million hospitalized days and 31.4 million outpatient visits.
- Persons aged 18 to 64 incurred 30% of these hospitalizations and outpatient visits, which translates into 128,000 life years lost as a direct result of the flu.

Source: unpublished CDC data



# Seasonal Influenza

- Seasonal influenza viruses:
  - Are a public health problem every year.
  - Circulate throughout the human population.
  - Spread easily from person to person.



# Beyond Seasonal Influenza

- Outbreaks of influenza in animals, especially when happening simultaneously with annual outbreaks in humans, increase the chances of a pandemic, through the merging of animal and human influenza viruses.

Source: WHO at <http://www.who.int/csr/disease/influenza/pandemic/en/>



# Modes of Influenza Transmission

- The vast majority of influenza is spread from person to person by droplet spread or direct contact. Outside the body the influenza virus may persist for sometime, especially in conditions of low relative humidity and cooler temperatures. Specifically, the influenza virus can survive for 1-2 days on hard surfaces, 8-12 hours on soft surfaces, and 5 minutes on hands, resulting in some spread by indirect contact.

Source: Toronto Pandemic Influenza Plan (2005)



# Potential Affects of a Pandemic in the US

- The US Department of Health and Human Services has previously estimated that in a moderate influenza pandemic, the United States might experience 209,000 deaths, with 128,750 patients requiring ICUs and 64,875 patients needing mechanical ventilators.

Source: <http://www.pandemicflu.gov/plan/pandplan.html>



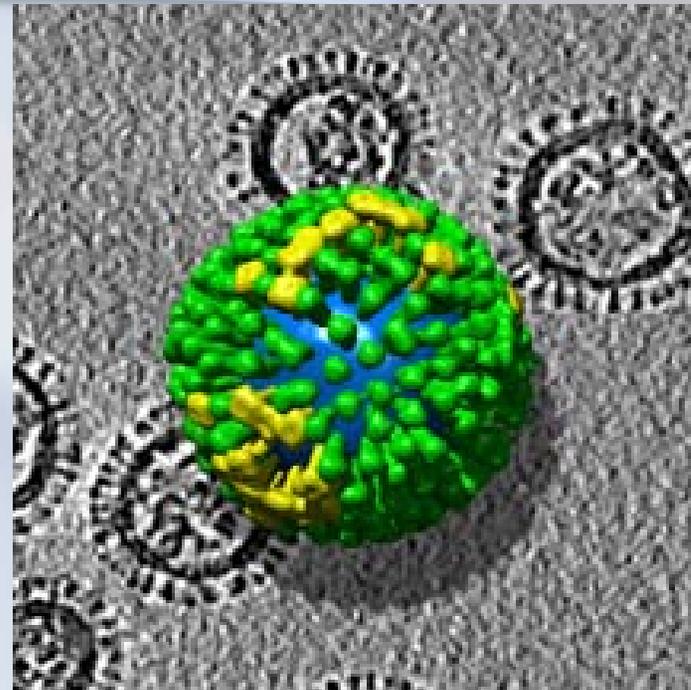
# Influenza Viruses

- There are three types of influenza virus—
  - A, B, and C
- Only the A and B types can cause flu epidemics.
- Influenza A virus is found in humans and many other animals.
- There are over 100 subtypes of Influenza A virus.

Source: CDC at <http://www.cdc.gov/flu/avian/gen-info/transmission.htm>

# Influenza Viruses

- Influenza viruses contains two glycoproteins: hemagglutinin (HA) and neuraminidase (NA). These two proteins determine the subtypes of Influenza A virus. There are 16 H subtypes and 9 N subtypes.



**Influenza A virus particles**

*Courtesy of Audray Harris, Bernard Heymann and Alasdair C. Steven, LSBR, NIAMS, NIH.*



# Influenza A Virus

- All Influenza A virus subtypes have been found in wild birds, which are thought to be a natural reservoir of Influenza A virus and the source of influenza A viruses in all other animals

Source: [www.cdc.gov/flu/about/viruses/transmission.htm](http://www.cdc.gov/flu/about/viruses/transmission.htm)



# The Perfect Epidemiologic Storm

Three essential conditions must be met for an outbreak to begin:

- A new flu virus must emerge from the animal reservoirs that have produced and harbored such viruses —one that has never infected human beings and therefore one for which no person has developed antibodies.
- The virus has to make humans sick (most do not).
- It must be able to spread efficiently, through coughing, sneezing, or a handshake.

Source: NGA Pandemic Primer, 2007  
<http://www.nga.org/Files/pdf/0607PANDEMICPRIMER.PDF>



# H1N1, Swine Flu, or S-OIV?

- The proper technical name is “H1N1 Influenza A”.
- “Swine flu” is a misnomer and **should not be used** to describe the current H1N1 outbreak in the human population.
- The World Health Organization has stopped using the term “swine flu” to avoid confusion over the danger posed by pigs.



# H1N1, Swine Flu, or S-OIV?

- “S-OIV” or swine-origin influenza virus is another term currently being used by the CDC although a direct link to a specific swine herd has not been established.
- The current H1N1 virus causing infection in the population **contains genetic fragments from birds, pigs, AND humans.**



# What is Swine Flu?

- Swine flu is NOT a human disease. It is a respiratory illness of pigs caused by a type A influenza virus that regularly causes outbreaks of influenza in pigs.
- Swine flu viruses cause high levels of illness and low death rates in pigs.
- Swine influenza viruses may circulate among swine throughout the year, but most outbreaks occur during the late fall and winter months similar to outbreaks in humans. The classical swine flu virus (an influenza type A H1N1 virus) was first isolated from a pig in 1930.
- There is no evidence at this time that swine in the United States are infected with this virus strain and therefore, this is not an animal health or food safety issue.

Source: CDC at [www.cdc.gov/flu/swine/key\\_facts.htm](http://www.cdc.gov/flu/swine/key_facts.htm) *and* [www.usda.gov](http://www.usda.gov)



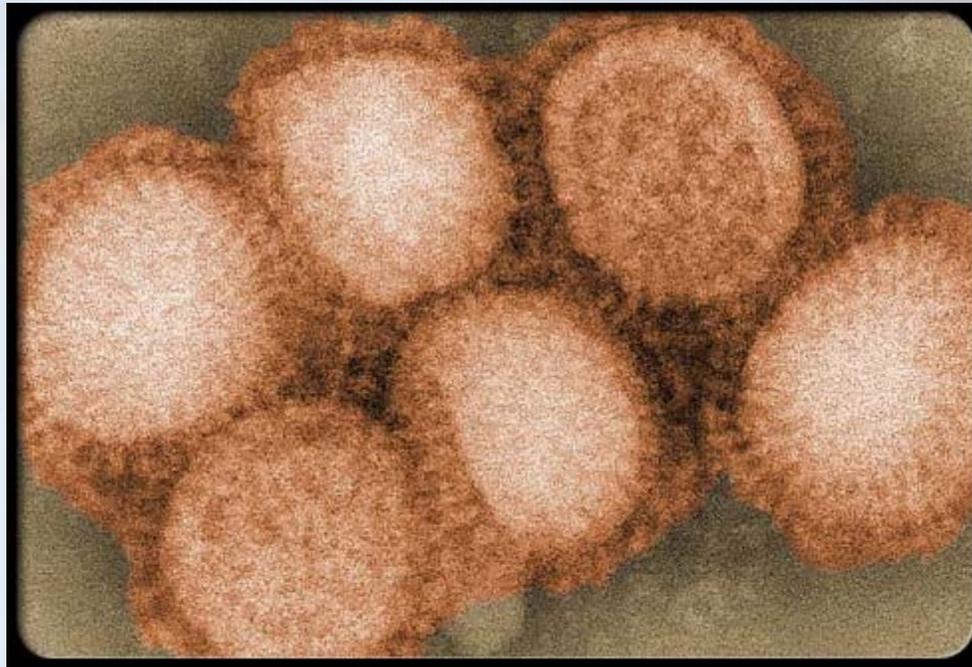
# Types of Swine Flu Viruses

- All influenza viruses change constantly.
- Over the years, different variations of swine flu viruses have emerged. At this time, there are four main influenza type A virus subtypes that have been isolated in pigs: H1N1, H1N2, H3N2, and H3N1.
- Most of the recently isolated influenza viruses from pigs have been H1N1 viruses.
- Again, there is no evidence at this time that swine in the United States are infected with this virus strain and therefore, this is not an animal health or food safety issue.

Source: CDC at [www.cdc.gov/flu/swine/key\\_facts.htm](http://www.cdc.gov/flu/swine/key_facts.htm) and [www.usda.gov](http://www.usda.gov)



# Swine-Origin Influenza Virus (S-OIV) is an H1N1 Influenza A "Novel" Virus



**It contains genetic  
fragments from birds,  
pigs, AND humans**



# Current Outbreak of H1N1 Influenza A Virus

- The current outbreak is believed to have started in March 2009. Local outbreaks of an influenza-like illness were first detected in three areas of Mexico, but the virus responsible was not clinically identified as a new strain until April 24, 2009.

Source: Wikipedia at [http://en.wikipedia.org/wiki/2009\\_swine\\_flu\\_outbreak](http://en.wikipedia.org/wiki/2009_swine_flu_outbreak)



# Concerns About the Current H1N1 Strain

- This (H1N1) outbreak certainly poses the potential to be at least as serious as seasonal flu if not more so.
- Because this is a new (“novel”) virus, most people will not have immunity to it and so illness may be more severe and widespread as a result.
- The farther the virus spreads, the more chance it will mix, or “reassort” with other flu viruses in circulation and turn into something more lethal.

Source: ScienceNow Daily News at <http://sciencenow.sciencemag.org/cgi/content/full/2009/429/1>



# How could an H1N1 “novel” strain have emerged?

- Pigs may be infected with influenza A viruses from different species (e.g., ducks and humans) at the same time.
- This may allow the genes of these viruses to mix, creating new variants of the hemagglutinin and/or neuraminidase proteins on the surface of the virus.
- If these variants spread to humans, then they would not be recognized by the immune system, and so can cause seasonal epidemics of flu.

Source: CDC-- [www.cdc.gov/flu/about/viruses/transmission.htm](http://www.cdc.gov/flu/about/viruses/transmission.htm)



# Definition of Acute Febrile Respiratory Illness

- A measured temperature 100 degrees Fahrenheit **and**
- Recent onset of at least one of the following: rhinorrhea or nasal congestion, sore throat, or cough.

Source: CDC at [http://www.cdc.gov/swineflu/casedef\\_swineflu.htm](http://www.cdc.gov/swineflu/casedef_swineflu.htm)



# CDC Case Definition of Swine-Origin Influenza Virus

- A ***confirmed case*** of S-OIV infection is defined as a person with an acute febrile respiratory illness with laboratory confirmed S-OIV infection at CDC by one or more of the following tests:
  - real-time RT-PCR
  - viral culture

Source: CDC at [http://www.cdc.gov/swineflu/casedef\\_swineflu.htm](http://www.cdc.gov/swineflu/casedef_swineflu.htm)



# CDC Case Definition of Swine-Origin Influenza Virus

- A ***probable case*** of S-OIV infection is defined as a person with an acute febrile respiratory illness who is positive for influenza A, but negative for H1 and H3 by influenza RT-PCR.

Source: CDC at [http://www.cdc.gov/swineflu/casedef\\_swineflu.htm](http://www.cdc.gov/swineflu/casedef_swineflu.htm)



# CDC Case Definition of Swine-Origin Influenza Virus

- A ***suspected case*** of S-OIV infection is defined as a person with acute febrile respiratory illness with onset
  - within 7 days of close contact with a person who is a confirmed case of S-OIV infection, or
  - within 7 days of travel to community either within the United States or internationally where there are one or more confirmed cases of S-OIV infection, or
  - resides in a community where there are one or more confirmed cases of S-OIV infection.

Source: CDC at [http://www.cdc.gov/swineflu/casedef\\_swineflu.htm](http://www.cdc.gov/swineflu/casedef_swineflu.htm)

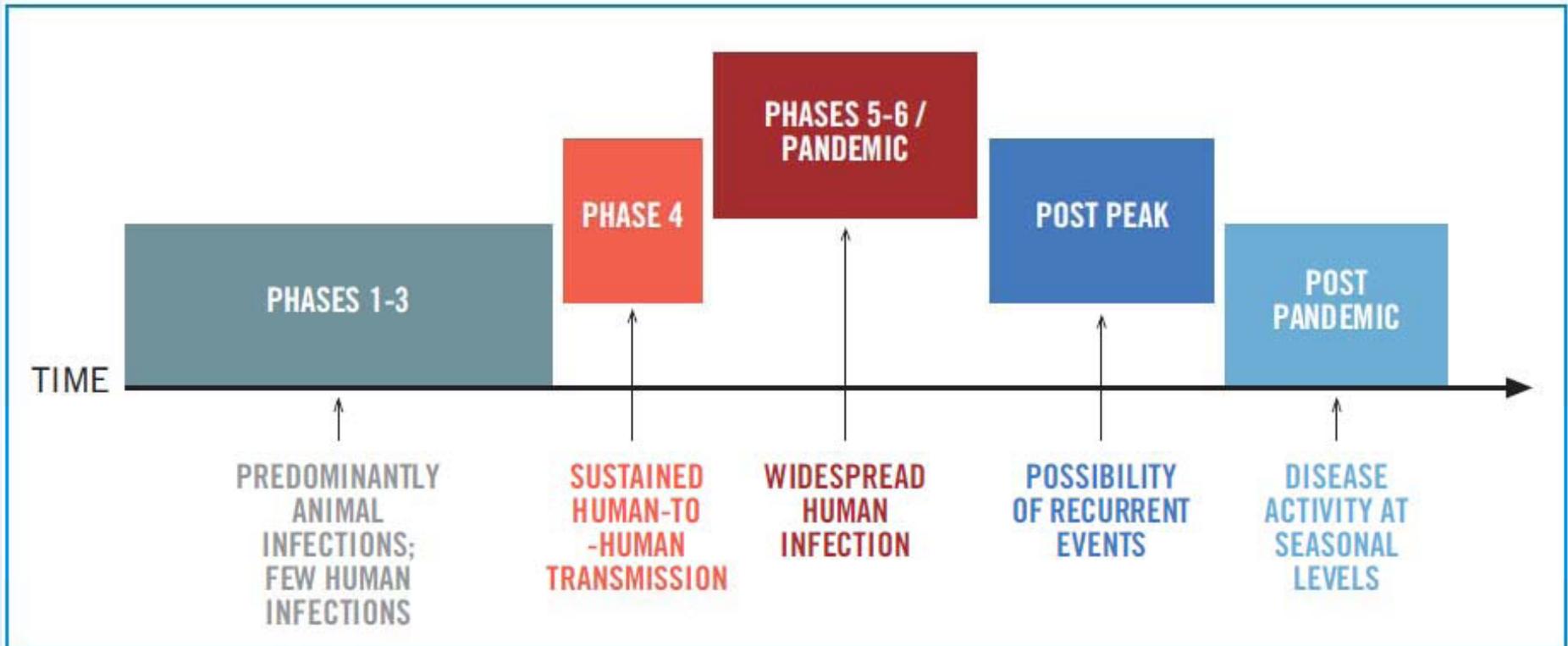


# Definition of a Pandemic

- Pandemic is a worldwide epidemic; an epidemic occurring over a wide geographic area and affecting a large number of people.

# WHO Pandemic Influenza Phases

**FIGURE 3**  
**PANDEMIC INFLUENZA PHASES (2009)**



5/1/2009

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# Stages of an Influenza Pandemic

- **Phase 1**-- no viruses circulating among animals have been reported to cause infections in humans.

Source: World Health Organization



# Stages of an Influenza Pandemic

- **Phase 2**-- an animal influenza virus circulating among domesticated or wild animals, known to have caused infection in humans.
- **Phase 3**-- an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people (but no human-to-human transmission sufficient to sustain community-level outbreaks).

Source: World Health Organization

A person wearing a blue surgical cap and a white face mask, looking down. The background is a light blue gradient.

# Stages of an Influenza Pandemic

- **Phase 4**--characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause “community-level outbreaks.” The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic.

Source: World Health Organization



# Stage 5- Pandemic Is Imminent

- Characterized by human-to-human spread of the virus into at least two countries in one WHO region.
- The declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
- The designation of the global pandemic phase will be made by the Director-General of WHO.

Source: World Health Organization



## Stage 6-The Pandemic Stage

- Characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in **Phase 5**.
- Designation of this phase will indicate that a global pandemic is under way.

Source: World Health Organization



# What You Need to Know About the H1N1 Influenza A Virus

- Influenza viruses are not transmitted by food.
- You cannot get influenza from properly handled and cooked food, eating pork or pork products.
- Our food supply is protected.
- Testing programs are in place.
- All animals used for food, including pigs, are inspected by USDA.

Source: CDC at [http://www.cdc.gov/swineflu/key\\_facts.htm](http://www.cdc.gov/swineflu/key_facts.htm) and [www.usda.gov](http://www.usda.gov)



# How does H1N1 Influenza A spread?

- Although it is unusual for people to get influenza virus infections directly from animals, sporadic human infections and outbreaks caused by certain avian influenza A viruses and pig influenza viruses have been reported.

Source: CDC at [http://www.cdc.gov/swineflu/key\\_facts.htm](http://www.cdc.gov/swineflu/key_facts.htm)



# How does H1N1 Influenza A spread?

- Influenza viruses can be directly transmitted from pigs to people and from people to pigs.
- In general, human infection with flu viruses from pigs are most likely to occur when people are in close proximity to infected pigs, such as in pig barns and livestock exhibits housing pigs at fairs, or environments contaminated with swine flu viruses.

Source: CDC at [http://www.cdc.gov/swineflu/key\\_facts.htm](http://www.cdc.gov/swineflu/key_facts.htm)



# How does H1N1 Influenza A spread?

- Human-to-human transmission of the H1N1 virus is thought to occur in the same way as seasonal flu occurs in people, which is mainly person-to-person transmission through coughing or sneezing of people infected with the influenza virus.
- People may become infected by touching something with flu viruses on it and then touching their mouth or nose.

Source: CDC at [http://www.cdc.gov/swineflu/key\\_facts.htm](http://www.cdc.gov/swineflu/key_facts.htm)



# A Diagnostic Challenge

- A pandemic flu carrier might not show any symptoms for up to two days while still shedding the virus, thus making it harder to isolate.

Source: NGA Pandemic Primer, 2007  
<http://www.nga.org/Files/pdf/0607PANDEMICPRIMER.PDF>



# Pandemic Planning Assumptions

- The typical incubation period for influenza averages 2 days.
- Persons who become ill may transmit infection for one half to one day before the onset of illness.
- On average about 2 secondary infections will occur as a result of transmission from someone who is ill.
- In an affected community, a pandemic outbreak will last about 6 to 8 weeks.
- Work/school absenteeism may be as high as 40% at the peak.
- At least two pandemic disease waves are likely.



# Potential Strategies to Decrease the Impact

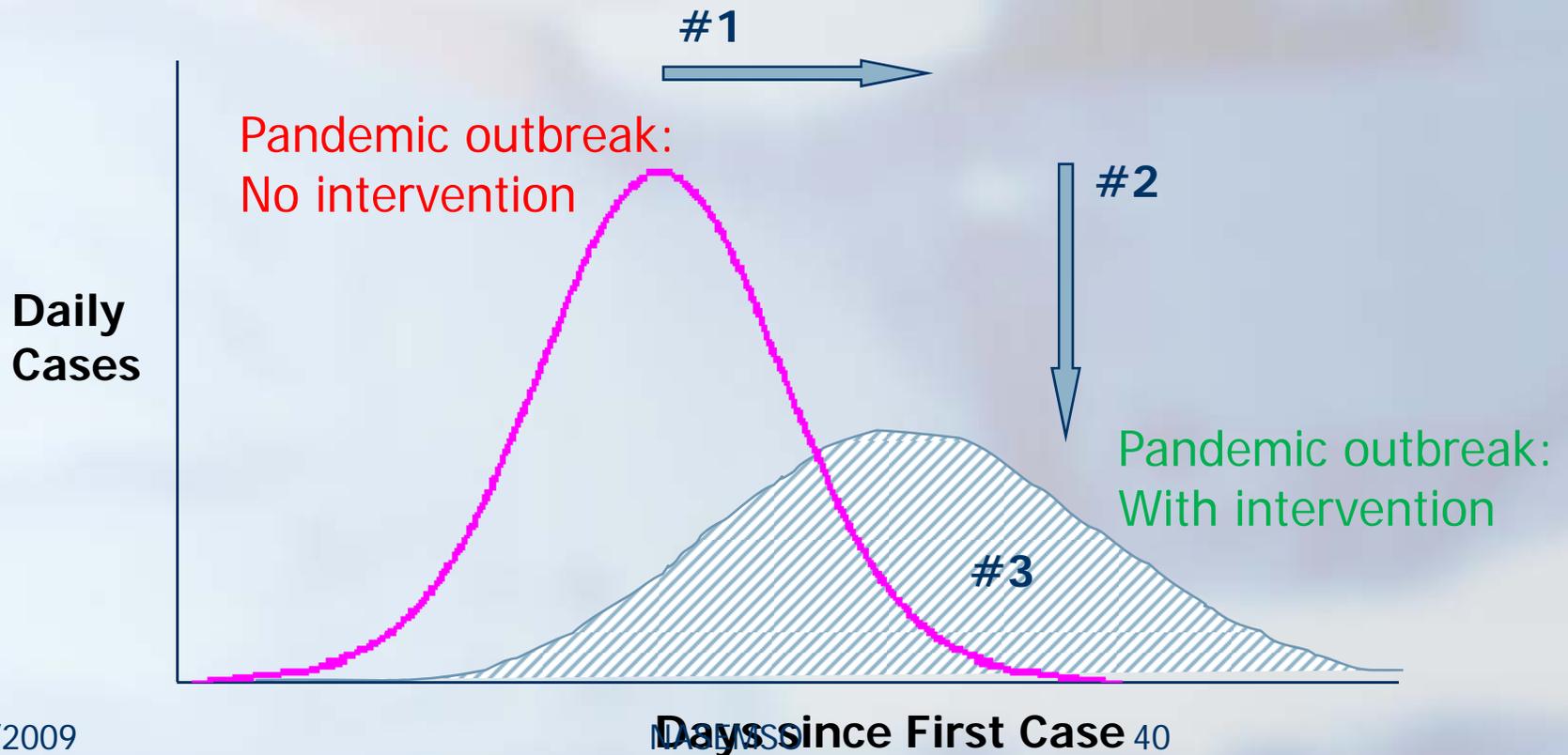
- Prevent or delay introduction of the virus
- Disease containment
- Social distancing
- Antiviral treatment and isolation for people with illness
- Voluntary quarantine for those exposed
- Vaccine when available

Source: DHHS Community Strategy for Pandemic Influenza Mitigation (2007)



# Effect of Community-Based Interventions

1. Delay disease transmission and outbreak peak
2. Decompress peak burden on healthcare infrastructure
3. Diminish overall cases and health impacts



5/1/2009



# CDC Interim Guidance IS Currently Available

- Multiple topics to meet a variety of needs
- This is a rapidly evolving situation
- All guidance should be considered interim and checked frequently for updates
- <http://www.cdc.gov/swineflu/guidance/>

# Critical Strategies

## ■ Respiratory Hygiene

- Cover your mouth when you sneeze or cough
- WASH YOUR HANDS FREQUENTLY
- Avoid touching your face, eyes, nose, mouth
- If you are sick, STAY HOME
- Immediately discard used tissues and then WASH YOUR HANDS!





# Role for Antivirals

- Antiviral drugs will be used to treat H1N1 Influenza A or to prevent infection with H1N1 viruses.
- These medications must be prescribed by a health care professional.
- Influenza antiviral drugs work best when started soon after illness onset (within two 2 days), but treatment with antiviral drugs should **still be considered after 48 hours of symptom onset, particularly for hospitalized patients or people at high risk for influenza-related complications.**

# Use of Antivirals

- Laboratory testing on these H1N1 Influenza A viruses so far indicate that they are **susceptible** (sensitive) to **oseltamivir** and **zanamivir**.





# Vaccines for the Novel Strain of H1N1

- Development started as soon as the new strain was identified.
- May not be available for 4-6 months.



# What remains is unknown...

- Limited mutual aid?
- Sustained response?
- “Business as usual”?
- All sectors of society and gov’t involved?
- Workforce disruption?
- Other disasters may still occur....

# Worth Repeating...

**Coughing spreads germs. Protect yourself and others.**



- Cover your cough.



- A face mask may be needed if you are coughing.



- Wash hands often.

# EMS & 9-1-1 Critical Components of the National Strategy

