

Novel H1N1 Influenza



*It's the
flu after
all!*

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9 November 2009

Objectives of this Talk

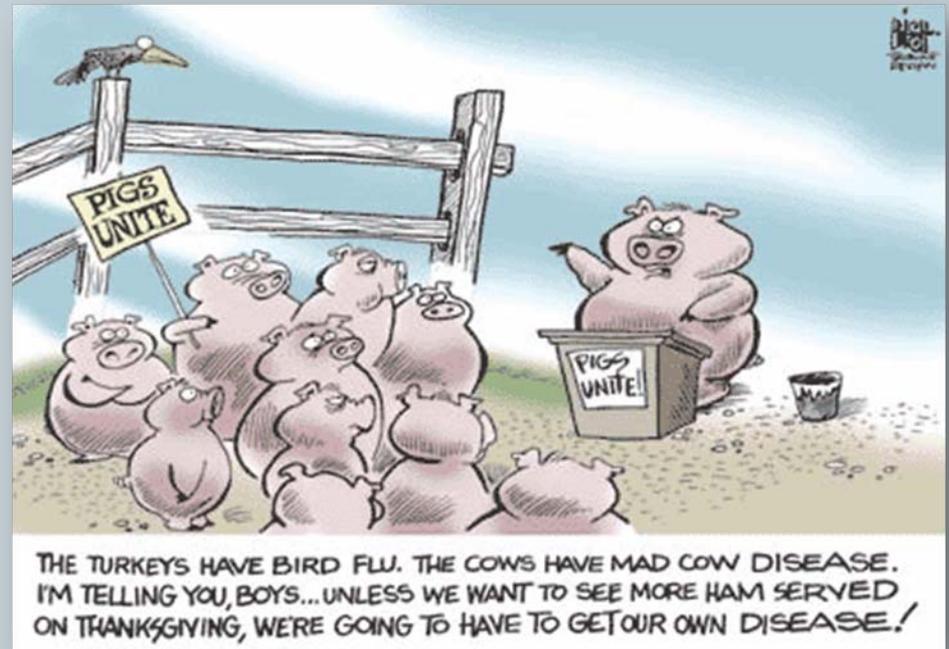
- **Influenza – A Primer.....**

- What is the flu?
- How do you get it?
- What's a virus anyhow?
- Can the flu be prevented, treated?
- What's a pandemic?

- **H1N1 – a “Novel” Strain of Flu...**

- How is it different from regular flu?
- What about vaccine and treatment for H1N1 flu?

- **A final word from the pigs....**



What is Influenza?



- Highly infectious viral illness
- Epidemics reported since 16th century
- Virus first isolated in 1933
- Two basic types – influenza A and influenza B
- First vaccine licensed 1945

What are the Symptoms of the Flu?



- Sudden onset of fever, dry cough, muscle aches, sore throat, headache, runny nose, lack of energy
- Fever and body aches last three to five days.
- Cough and lack of energy may linger longer.
- Symptoms not a lot different than those of other viral respiratory illness but tend to be more severe

How is Influenza Spread?



- Mainly via large droplets in the air
 - Coughing, sneezing
 - “Spitting distance”
- Also likely through contact with contaminated hands, surfaces

How Contagious is Influenza?

Very!



How Quickly May an Exposed Person Become Ill with Influenza?

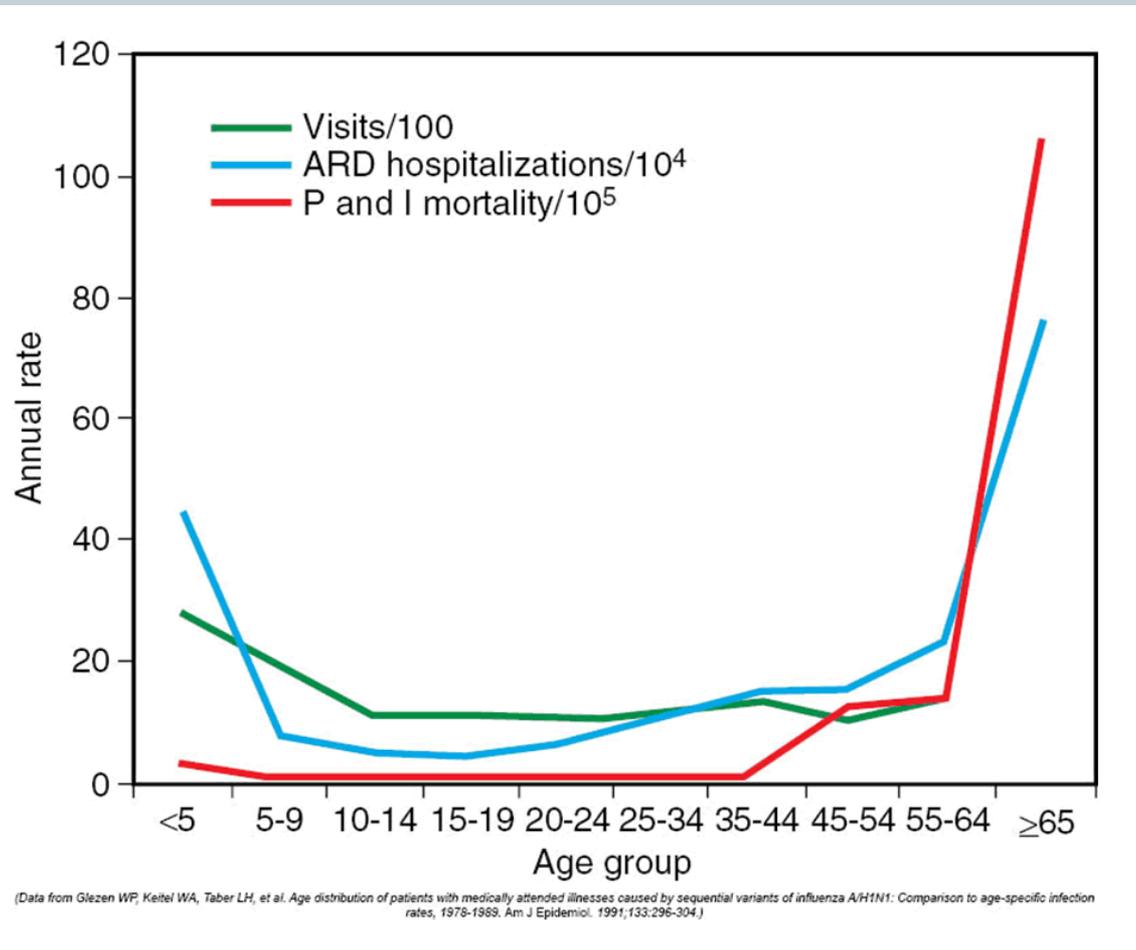


Answer: Pretty Quickly!

- Two days after you are infected, you typically can become ill
- Infected people “shed” virus – infect others
 - Shedding starts one day **before** you are sick
 - Peak shedding in first three days
 - Subsides by days 5-7 (kids may shed virus longer)



How Bad Can Influenza Be?



ARD – acute respiratory disease , P and I – pneumonia and influenza

Typical Burden of Influenza



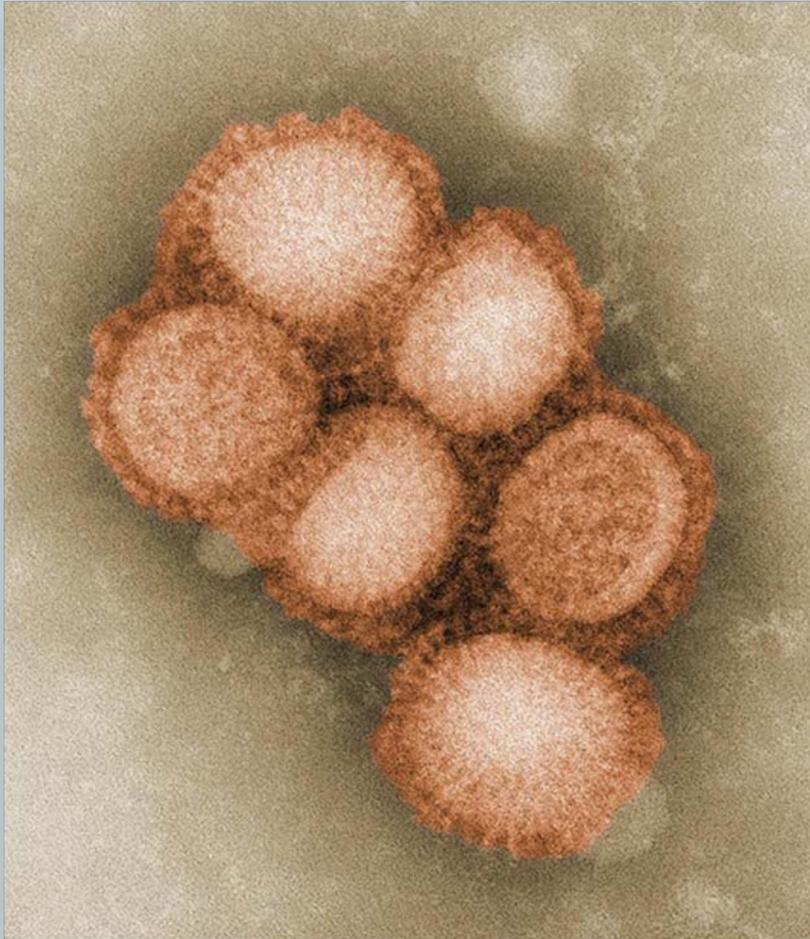
- 10% to 20% of the population is infected with influenza virus each year
- Average of more than 200,000 excess hospitalizations each year in the U.S.
 - Persons 65 and older and 2 years and younger at highest risk
- Average of 36,000 deaths each year (U.S.)
 - Persons 65 and older at highest risk of death

Who is at Risk of Complications of Influenza?



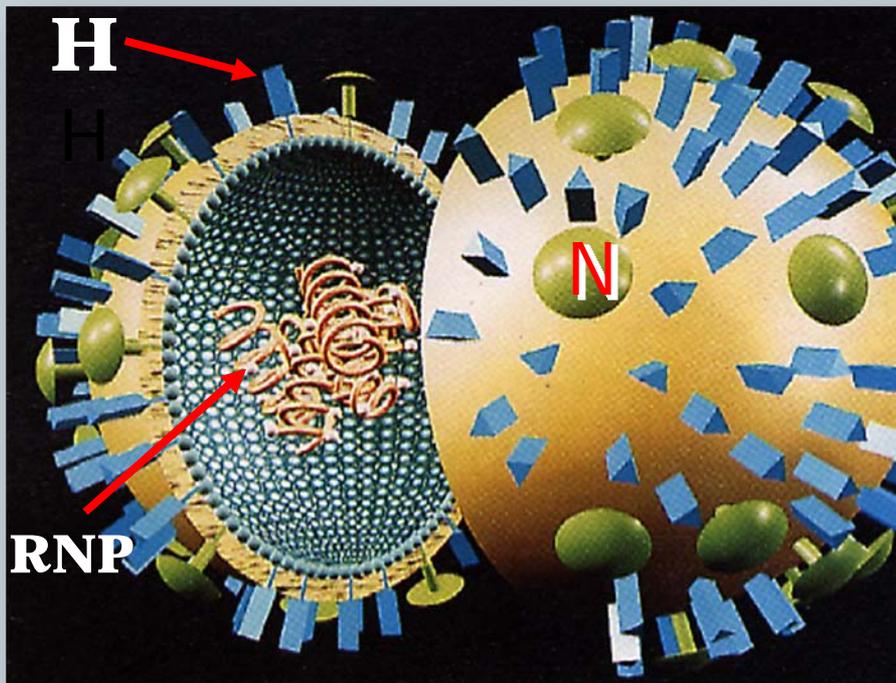
- Children younger than 2 years old
- Adults 65 years of age or older
- Pregnant women
- Persons with the following conditions:
 - Chronic lung, heart, kidney, liver, and blood diseases; diabetes
 - Chronic neuromuscular and cognitive disorders that can compromise respiratory function or the handling of respiratory secretions
 - Disorders of the immune system including those caused by medications or by HIV
 - Persons younger than 19 years of age who are receiving long-term aspirin therapy, because of an increased risk for Reye syndrome.

Influenza is a Viral Illness – What is a virus?



- Smaller than bacteria, fungi, animal cells
- Can't “live” independently – have to “hijack” cells to reproduce
- Human cells become “virus factories”
- Influenza virus kills cells in respiratory passages.

What does the Influenza Virus Look Like?



- **Hemagglutinin** protein – allows the virus to stick to cells
- **Neuraminidase** protein – helps the virus be released from cells
- **Genes (RNP)** are segmented into 8 parts – can reassort – allows two or more influenza viruses to mix and match genes

Who Cares about Hemagglutinin and Neuraminidase?



- **Your immune system does!!**
- Your immune system makes antibodies against H and N – *But!* – influenza A continually changes its “stripes”
 - Minor changes - “drift” – responsible for yearly epidemics
 - Major changes - “**shift**” – can cause pandemics of influenza

What is Pandemic Influenza?



- It is an influenza epidemic characterized by:
 - Influenza A strain where few if any have immunity (a “shifted” strain)
 - Influenza A strain capable of easy transmission from person to person
 - Influenza A strain capable of causing significant illness

Influenza Pandemics 20th Century



Credit: US National Museum of Health and Medicine

1918: “Spanish Flu” (H1N1)

20-40 m deaths

675,000 US deaths



1957: “Asian Flu” (H2N2)

1-4 m deaths

70,000 US deaths



1968: “Hong Kong Flu” (H3N2)

1-4 m deaths

34,000 US deaths

Can Influenza Be Prevented?



- **Yes – Vaccine!**
 - 70% - 90% effective among healthy persons <65 years of age
 - 30 - 40% effective among frail elderly persons
 - 50% - 60% effective in preventing hospitalization
 - 80% effective in preventing death

Who Should be Vaccinated for *Seasonal* Flu?



- Persons 50 years old or greater
- Children/adolescents aged 6 mos. to 18 years (particularly those 6-59 mos.)
- Residents of nursing homes or other chronic care facilities
- Adults or children with chronic respiratory or cardiac conditions
- Adults or children who have required regular medical care in the preceding year for chronic metabolic disease such as diabetes, kidney disease, hemoglobinopathies, immunodeficiency
- Adults and children with any neurologic condition that can compromise respiratory function
- Children and adolescents (6 mos to 18 yrs) who are taking aspirin regularly
- Women who will be pregnant during the influenza season
- Persons who live with or care for persons at high risk for influenza-related complications, including healthy household contacts and caregivers of children aged 0-59 months
- Healthcare workers

Why is it Necessary to Be Vaccinated Yearly for Influenza?



- Influenza vaccine expires June 30 each year
- Antibodies wane during the year
- Surface antigens drift and shift (remember ***H***emagglutinin and ***N***euraminadase?)

Inactivated Influenza Vaccine Adverse Reactions



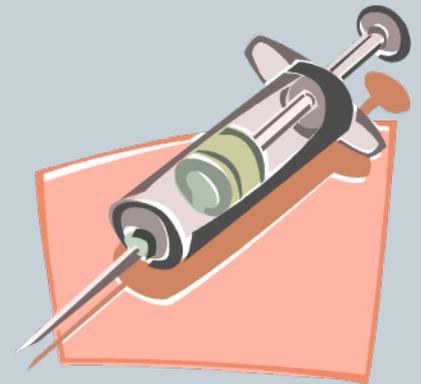
- Local reactions 15% - 20%
- Fever, malaise uncommon
- Allergic reactions rare
- Neurological reactions very rare



Inactivated Influenza Vaccine - A Bit More!



- Inactivated influenza vaccine contains only noninfectious fragments of influenza virus
- Inactivated influenza vaccine *cannot cause* influenza disease

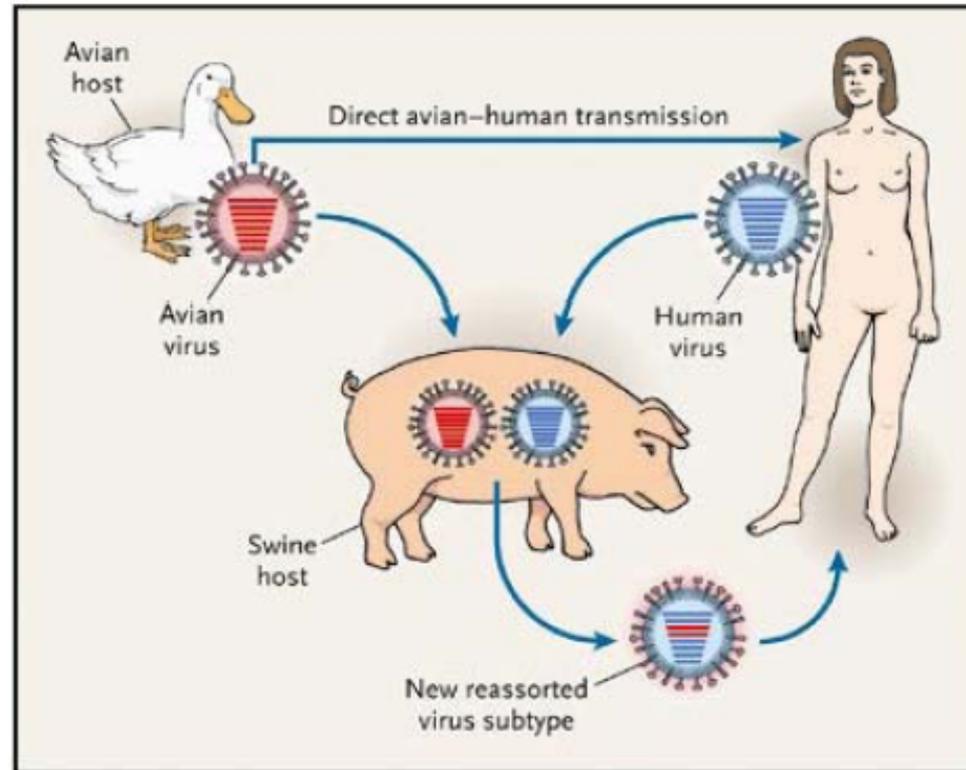


Is There Treatment for Influenza?



- Yes – There are treatments which vary according to the circulating strain of influenza
 - Adamantanes – amantadine and rimantadine – older drugs - ineffective against influenza B and some influenza A strains
 - Neuraminidase inhibitors – oseltamivir (*Tamiflu*) and zanamivir (*Relenza*) – effective against influenza B and most (but not all) strains of influenza A
- Most effective if given early (≤ 48 hrs); shortens and lessens severity of illness

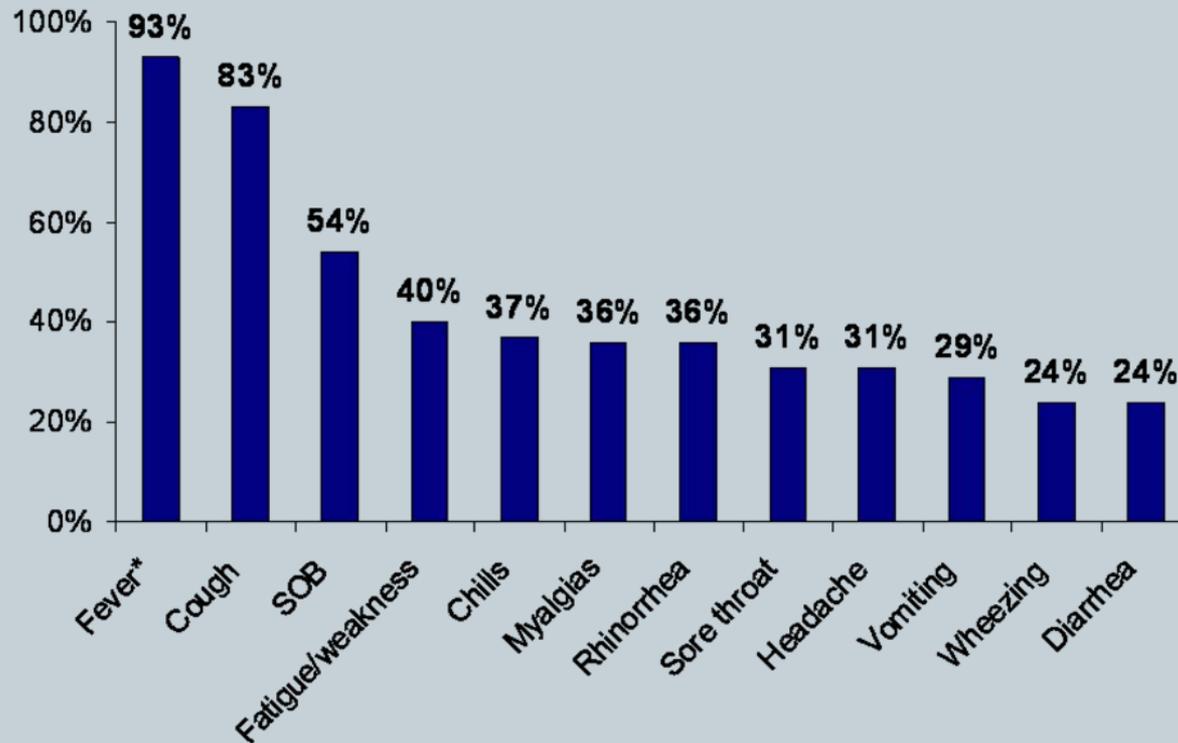
Novel H1N1 Influenza A 2009



What are the Symptoms of H1N1 Influenza?



Symptoms and signs are basically the same as those of regular “seasonal” influenza--



Is H1N1 Worse than “Regular” Seasonal Influenza?



- It is not really known if novel H1N1 influenza is more aggressive than “regular” seasonal flu.
- It appears to be highly contagious.
- It is causing severe illness in younger age groups than is typical for seasonal flu.

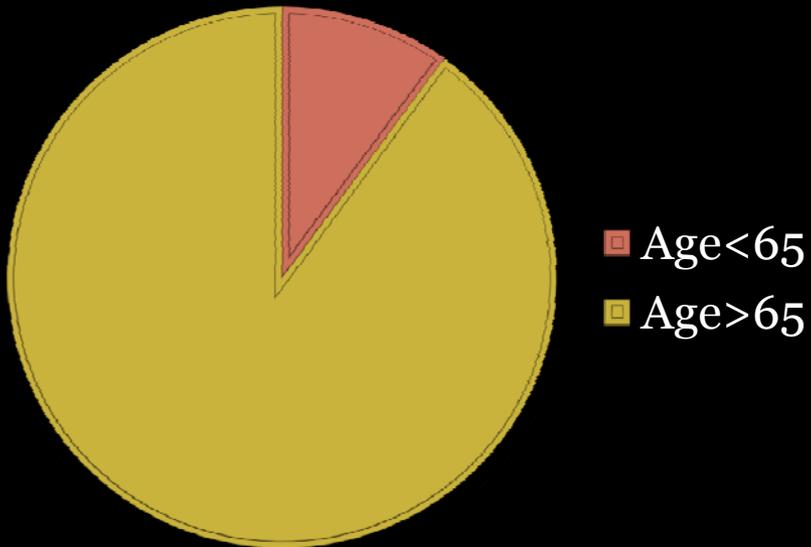
It's Not Your Grandpa's Influenza!



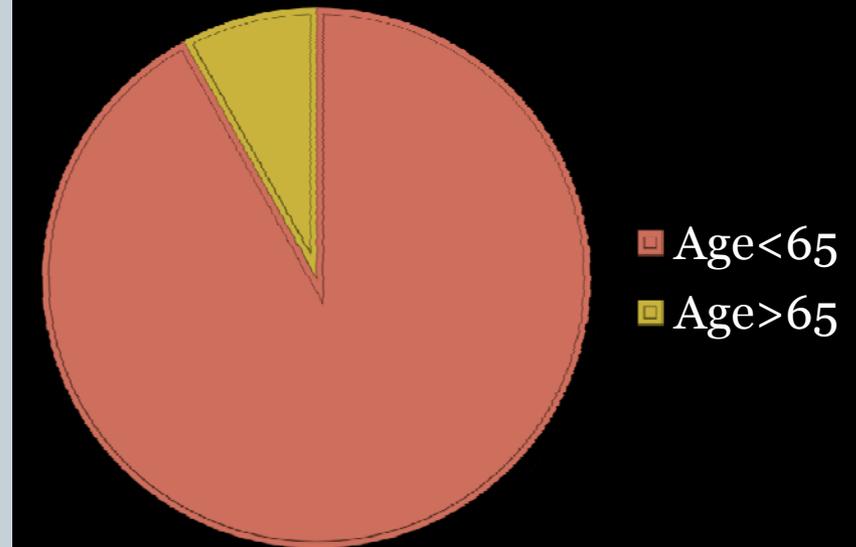
Seasonal Influenza A

Novel H1N1 Influenza A 2009

Deaths



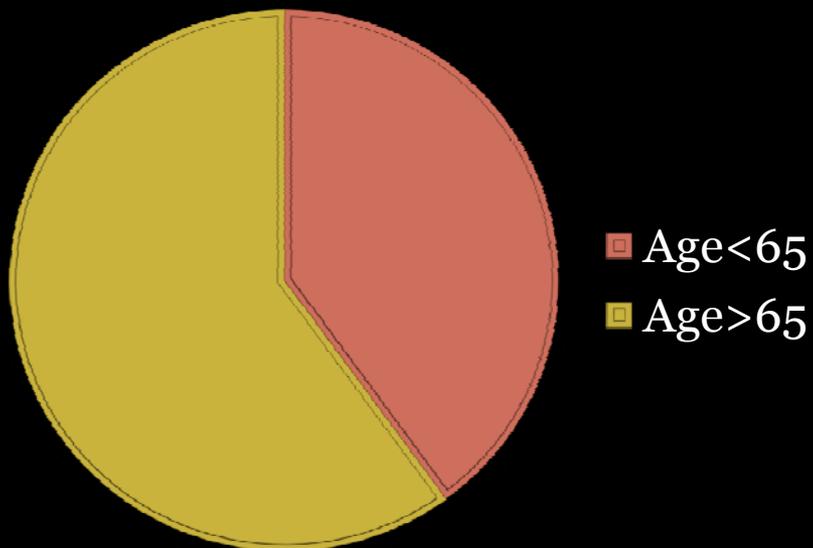
Deaths*



Like I Was Saying.....

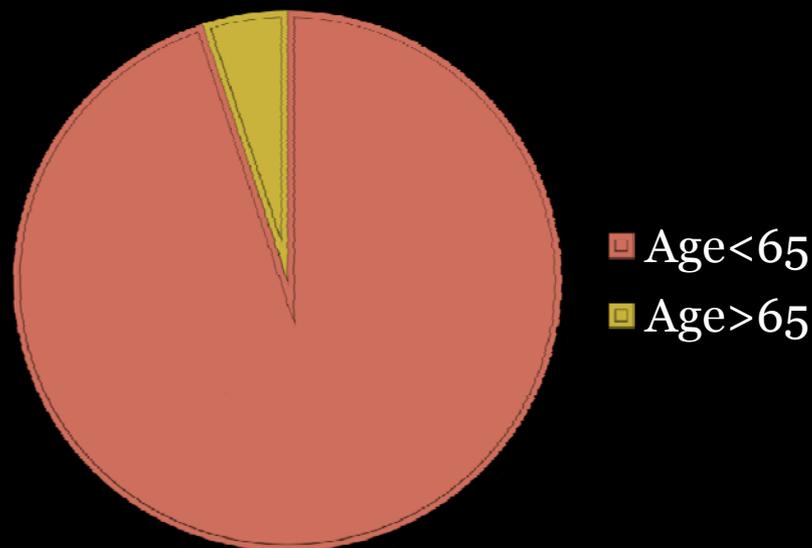
Seasonal Influenza A

Hospitalizations



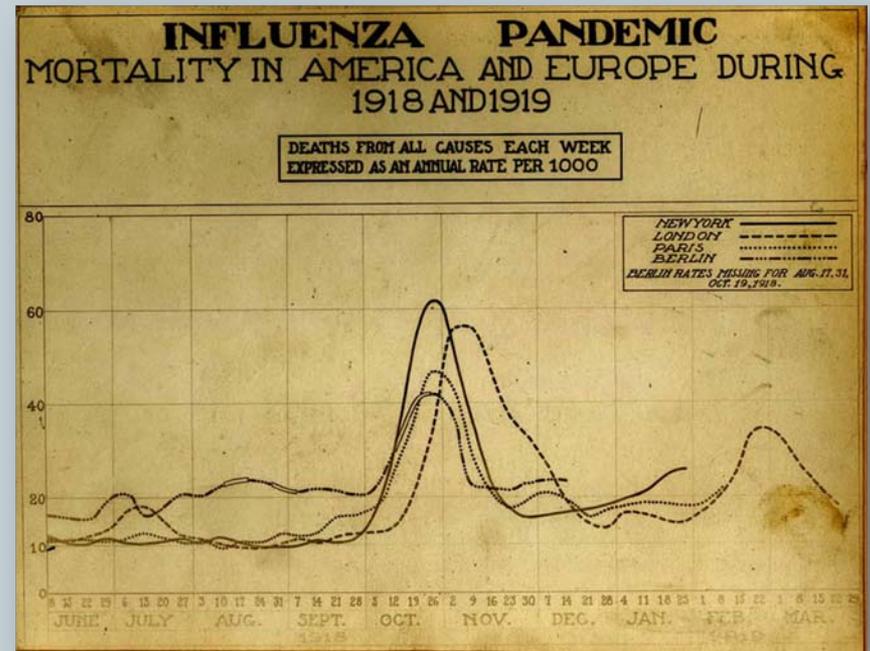
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Hospitalizations*

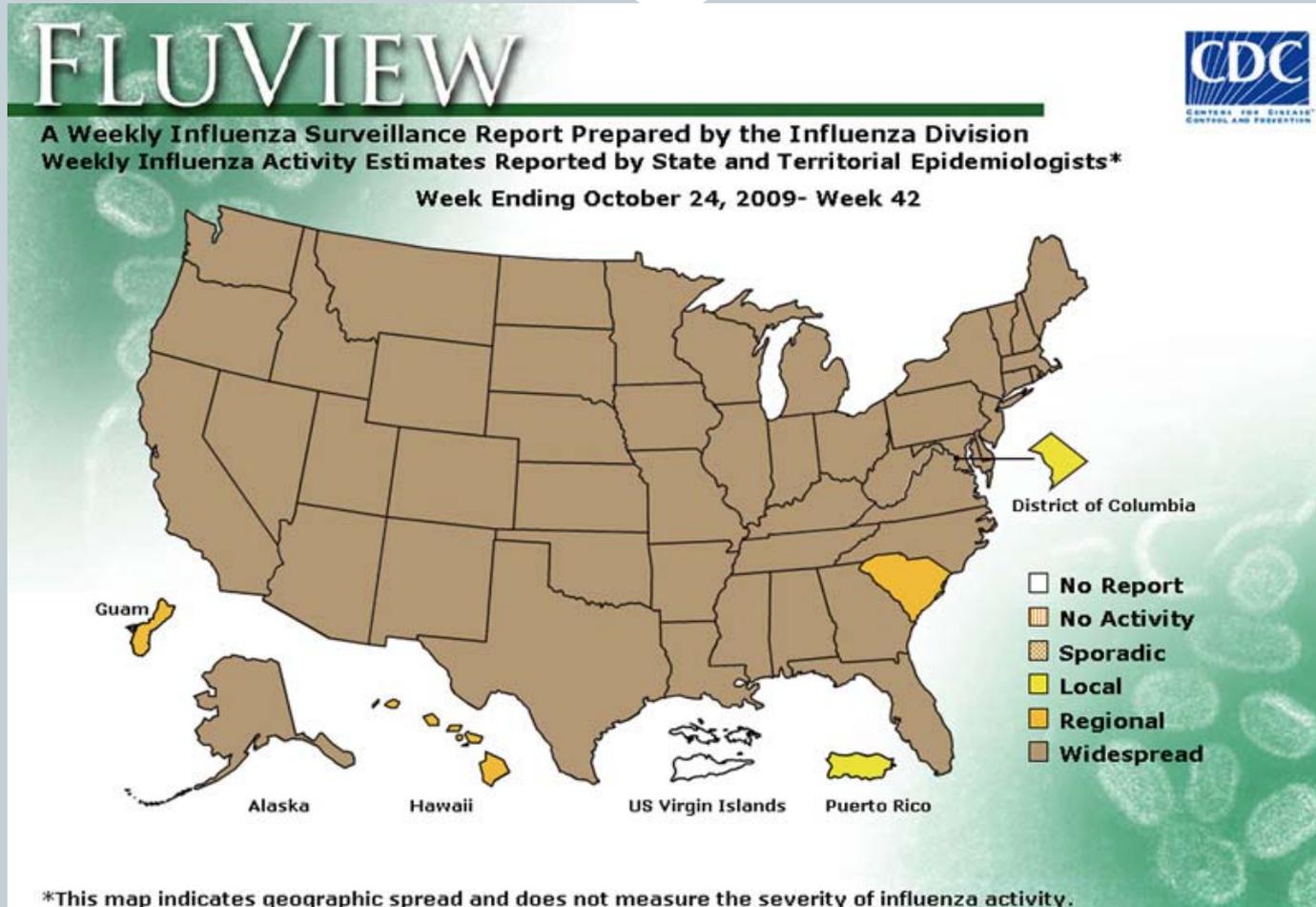


Why Aren't Older People Getting Sick Like Usual?

- Those born prior to 1947 or so likely have some immunity based on exposure to the descendant viruses from the 1918 “Spanish Flu.”
- If a person's aged greater than 65 become ill with H1N1 influenza, they are still at risk of complications.



H1N1 - It's “*Unseasonal*” and Widespread



Is There a Vaccine To Prevent H1N1?

Yes!



Who Should Get Novel H1N1 Influenza A Vaccine?*



- Pregnant women
- Persons who live with or provide care for infants aged <6 months (e.g., parents, siblings, and daycare providers)
- Health-care 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

*Order of target groups does not indicate priority

What About While The Vaccine is in Limited Supply? - (ACIP Recommendations)

• Vaccinate*

- Pregnant women
- Persons who live with or provide care for infants aged <6 months
- Health-care and emergency medical services personnel who have direct contact with patients or infectious material
- Children aged 6 months--4 years
- Children and adolescents aged 5-18 years who have medical conditions that put them at higher risk for influenza-related complications

• Defer Vaccination

- Healthy persons 5-24 years
- Persons 19-64 years with high risk medical conditions

*Order of target groups does not indicate priority

Who is *not* on the Vaccine Priority List?



- Healthy people aged greater than 25
- *Anybody* over age 65 regardless of health status
- This is a dramatically different recommendation from that of regular flu vaccine, but--
 - Remember who is getting sick from with H1N1.
 - Eventually, anyone who wants vaccinated (including seniors) will have access.

What About the Live Nasal Vaccine?



- It is safe and effective
- However, it shouldn't be given to—
 - Children younger than 2 years of age
 - Persons 50 years of age or older
 - Persons with chronic medical conditions
 - Immunosuppression from any cause
 - Pregnant women
 - Children and adolescents receiving long-term aspirin therapy
 - Children younger than 5 years with recurrent wheezing



Why are they so slow with that darn vaccine anyway?!!

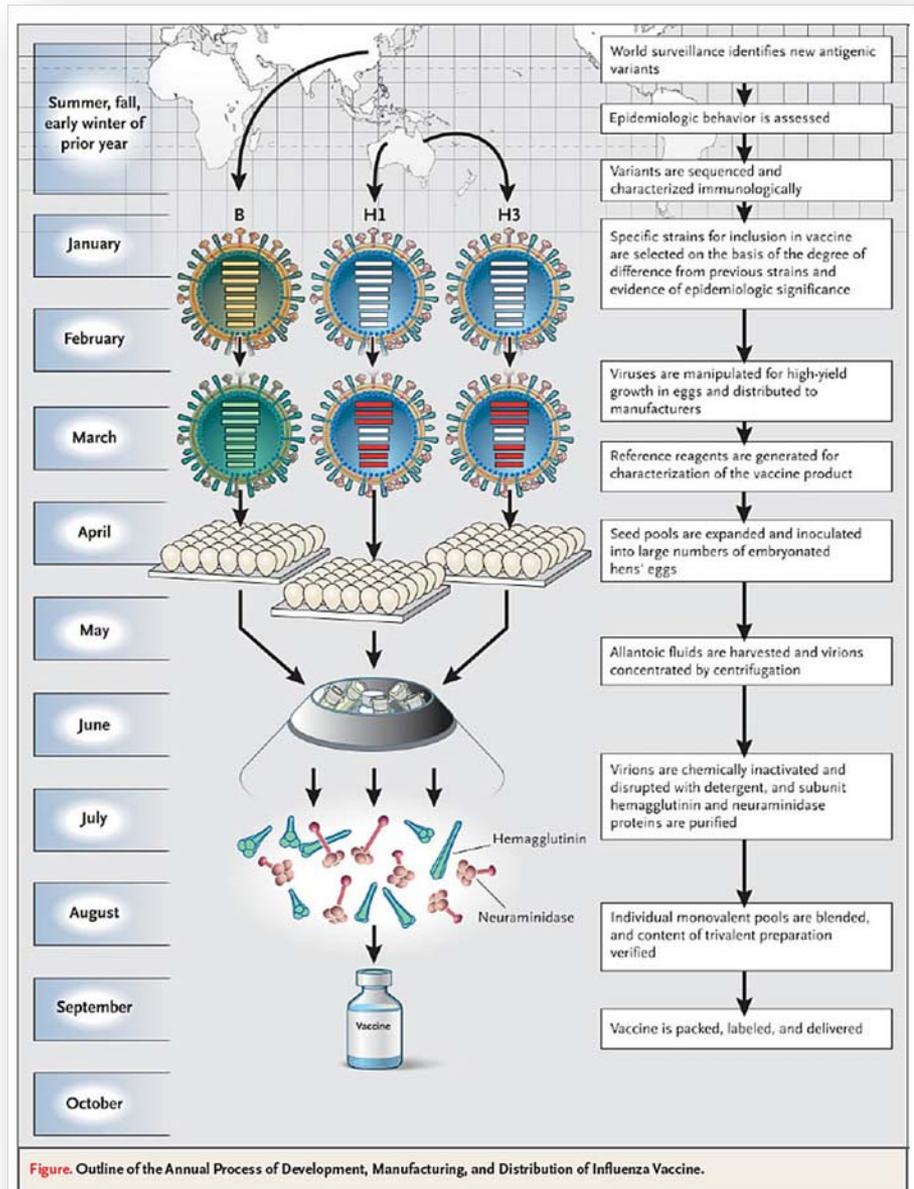
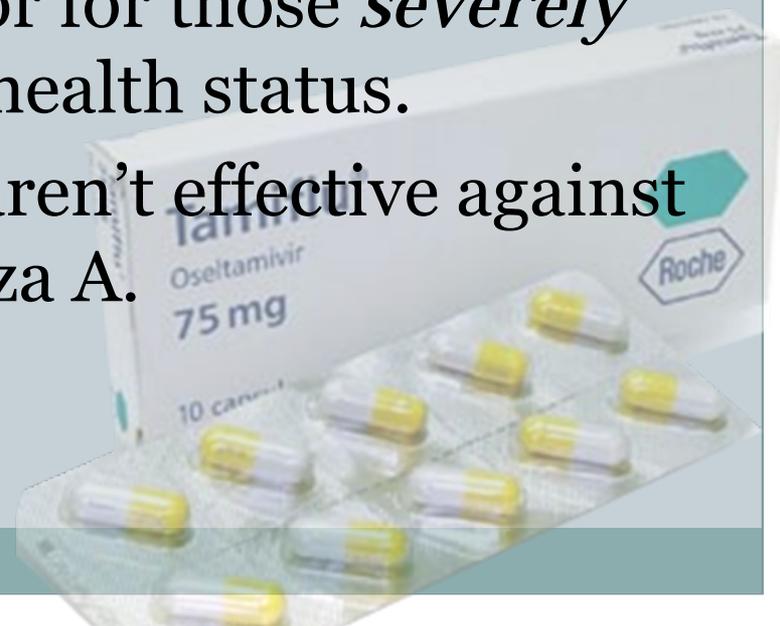


Figure. Outline of the Annual Process of Development, Manufacturing, and Distribution of Influenza Vaccine.

How About Antiviral Treatment for H1N1 Influenza?



- Oseltamivir (*Tamiflu*) and zanamivir (*Relenza*) are effective against novel H1N1 influenza A.
- Generally only indicated for those with risk factors for complications of influenza or for those *severely* ill with influenza regardless of health status.
- Amantadine and rimantadine aren't effective against this particular strain of influenza A.



What Else Can Be Done to Avoid the Flu?

- “Social Distancing”
- Hand washing
- Covering coughs





What is Yet to Come?

Influenza is very unpredictable so we don't entirely know....

- ? Subsequent waves of illness
- ? Change in virulence
- ? Antiviral resistance
- ? Vaccine match

“One thing the history of epidemics teaches us is that given our remarkable arsenal of treatments, public health measures and rapid surveillance and communications ability, there’s never been a better time to have a pandemic than today — except, that is, tomorrow.”

--Howard Markel, *American Epidemics, a Brief History*,
New York Times, May 2, 2009

A Final Word from the Pigs



***It
wasn't
our
fault!!***