Pandemic Influenza
or
When the Flu Hits the Fan
APIC HOT Chapter July 11, 2006

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Epidemiologist
Infectious Disease Control Unit
This time, you'd better listen to me...
BIRD FLU!...THANK GOD, I THOUGHT I HAD MAD COW DISEASE!
“CRACKER SCHMACKER! ... POLLY WANNA GAS MASK!!”
Yes, bird flu is coming! But we here at Ace Pharmaceuticals haven't been sitting on our hands.

We have developed a vaccine in capsule form that is 100 percent effective!

Three of these beauties every week fully protects you during the pandemic.

Awesome! What's it cost the average person?

$12,000 every seven days.
Outline

Flu basics

• Seasonal influenza versus pandemic flu
• Issues for prevention and control
• Considerations for the acute care setting
• Resources
NEED I SAY MORE???
Common Influenza Symptoms

- headache
- ear infection
- runny nose
- sore throat
- bronchitis
- muscle aches
- congested lungs
Flu Basics

• 3 Types of Influenza: A, B, C

• Symptoms of flu:
  - Fever > 100° F
  - Cough
  - Sore throat
  - Headache/muscle aches
  - Extreme fatigue
Flu Basics

• Respiratory not GI illness
• Incubation 1-3 days
• Duration of illness: 1-2 weeks
• Complications: secondary (bacterial) infections, exacerbation of underlying medical conditions
• US Deaths per year: >36,000
• US Hospitalizations per year: >100,000
• Best prevention is vaccine
Influenza A

• Only flu A has subtypes
• 3 subtypes have circulated widely in man (H1N1, H2N2, H3N2) (Hemagglutinin-Neuraminidase)

• Potential for tremendous genetic diversity
• Only flu A causes pandemics
Influenza B and C

- Less genetic diversity than A
- Causes disease of man only
- Do not lead to pandemics
- 1 strain of flu B is included in the flu vaccine
- Influenza C is never a component of the annual flu vaccine
<table>
<thead>
<tr>
<th>Etiologic Agents</th>
<th>Influenza A</th>
<th>Influenza B</th>
<th>Influenza C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Humans</strong></td>
<td>• Humans, swine, horses, ducks, chickens, seals &amp; whales</td>
<td>• Humans only</td>
<td>• Humans and swine</td>
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<tr>
<td><strong>Antigenic shift</strong></td>
<td>• Antigenic drift and shift</td>
<td>• Antigenic drift; no shift</td>
<td>• Antigenic drift; no shift</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>• Can cause high mortality in young persons</td>
<td>• Severe disease usually limited to elderly and high risk</td>
<td>• Mild disease</td>
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<td><strong>Pandemics</strong></td>
<td>• + Pandemics</td>
<td>• No Pandemics</td>
<td>• No seasonality</td>
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<td>• No Pandemics</td>
<td>• No Pandemics</td>
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</table>
Antigenic change

• **Antigenic ‘drift’ occurs in HA and NA**
  – Associated with seasonal epidemics
  – Continual development of new strains secondary to genetic mutations
  – A viruses & B viruses

• **Antigenic ‘shift’ occurs in HA and NA**
  – Associated with pandemics
  – Appearance of novel influenza A viruses bearing new HA or HA & NA
  – A viruses only
Influenza Nomenclature

- A (H1N1)/New Caledonia/20/99

- Type    subtype     Geographic origin    strain    number    year of isolation
Pandemic Influenza

It’s not a matter of if…
but a matter of when.
Recorded Influenza Pandemics

Spread of H2N2 influenza in 1957

"Asian influenza"

Feb.-Mar. 1957
Apr.-May 1957
Jun.-Aug. 1957
July – December, 2004

Jul-Dec 2004  Human total: Cases 9 (44) Deaths 8 (32)
January – June, 2005

Jan-Jun 2005  Human total: Cases 64 (108) Deaths 22 (54)
July – December, 2005

Jul-Dec 2005  Human total: Cases 34 (142) Deaths 22 (76)
January – March, 2006

Jan-Mar 8, 2006  Human total: Cases 33 (175) Deaths 20 (96)
Avian Flu Has Spread Across 3 Continents

Countries Reporting H5N1 Virus as of Mar 8, 2006
Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO

**July 2006**

<table>
<thead>
<tr>
<th>Country</th>
<th>2003 cases</th>
<th>2003 deaths</th>
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<td>Total</td>
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<td>46</td>
<td>32</td>
<td>95</td>
<td>41</td>
<td>85</td>
<td>55</td>
<td>229</td>
<td>131</td>
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</tbody>
</table>

*All numbers are cumulative, some countries have laboratory confirmed cases.*
Pandemic Influenza
(definition)

- World wide outbreak of a new strain of influenza to which virtually no one is immune
  - Novel strain
  - Susceptible population
  - Virulence
  - Transmissibility
- Emergence of a novel strain can occur via:
  - Radical change in virus already infecting humans
  - Change in virus previously only seen in animals that allows it to infect humans
20th Century Pandemics

- 1918 “Spanish Flu”
- 1957: Asian Flu
- 1968 Hong Kong
- Several ‘scares’
1918-1919 Pandemic

• Timeline
  – Spring: 1st wave of scattered US outbreaks
  – Summer: relatively low activity
  – October: severe disease; peak of 2\textsuperscript{nd} wave
  – Mid-winter: peak of 3\textsuperscript{rd} wave

• Deaths
  – >20++ million worldwide (50-100M)
  – 600,000 in US (nearly 50% in 20-40 year olds)
Approximate beginning of the epidemic, 1918

Source: America’s Forgotten Pandemic - The Influenza of 1918 - 1989
Students at San Diego High School during the flu epidemic of 1918
Surgical facemasks became an everyday fashion accessory. Their effectiveness was debated.
Children whose parents fell victim to influenza roamed the streets.
Pandemic Influenza
Limiting Pandemic Impact

Closure of public gathering places and schools
U.S. Life Expectancy 1900-1960


Life Expectancy: 30 38 46 54 62 70
20th Century Pandemics

• 1957: Asian Flu
  - >69,000 died in US
  - Limited vaccine available
20th Century Pandemics

- 1968: Hong Kong Flu
  - >33,000 died in US (mildest pandemic)
  - Slightly similar to Asian Flu, so some immunity may have been present
20th Century Pandemics—Not

- 1976: Swine Flu Scare
  - Novel virus identified at Fort Dix, NJ
  - Mass vaccination campaign, but virus never left Ft. Dix
20th Century Pandemics-not

- 1977: Russian Flu Scare
  - Illness mainly in children because the virus was similar to prior viruses
  - Vaccine was not ready until next season
20th Century Pandemics-not yet yet

• 1997: Avian Flu Scare (H5N1)
  - 6 die in Hong Kong
  - transmitted directly from chickens to people
  - Millions of chickens culled
  - Not spread person to person
20th Century Pandemics-not

- 1999 Avian Flu Scare
  - 2 children ill in Hong Kong with novel H9N2 virus
  - Not spread person to person
The Next Pandemic

• Experts consider flu pandemics to be inevitable, but we don’t know when the next one will occur

• Warning time in US: 1-6 months

• Simultaneous US outbreaks will last weeks to months (? years)

• Preventive and therapeutic measures will be in short supply (vaccine and antiviral medication)
The Next Pandemic

• Vaccine manufacturing and distribution
  – Takes 6 months minimum from time novel virus is identified
  – No guarantee that we will be able to make vaccine
  – Initial doses will not be sufficient to immunize everyone, so must prioritize
  – 2 doses will most likely be needed
What is Different Now? (1)

• The next pandemic may be **MORE** severe because...
  - Increased travel
  - Increase in population density
  - Young children in daycare year around
  - Larger population of immunocompromised
  - Only 3 vaccine manufacturers (6 in 1957)
What is Different Now? (2)

• The next pandemic may be **LESS** severe because…
  – Better global surveillance
  – More countries vaccinate high-risk
  – Vaccines are standardized & less reactogenic
  – Four antiviral drugs licensed for prophylaxis and treatment
  – Greater knowledge of influenza epidemiology, biology, and immunology
The Next Pandemic

- US impact estimates (worst case):
  - 100-200 million infected
  - 18-45 million requiring outpatient care
  - 300,000-800,000 hospitalizations
  - 88,000-300,000 (excess) deaths
The Next Pandemic

• Health care workers, teachers and first responders at highest risk

• Widespread illness in communities will lead to essential personnel shortages: military, police, fireman, utility and transportation workers, etc.
Prevention and Control
NOW BUSH WANTS US TO FIGHT THE BIRD FLU.
Ways to Mitigate Flu Pandemic

• Computer model depicts what happens with a pandemic flu – untreated on the top
• Treated on the bottom with
  – Antiviral treatment
  – Vaccination with unmatched strain of flu
  – Social distancing

http://www.nigms.nih.gov/News/Results/FluModel040306.htm
Guidelines

• Place patient in private room
• HC Professionals wear mask for close patient contact (past 3 feet – today 10 feet)
• And gowns and gloves if contact with respiratory contact is likely

http://www.CDC.gov/flu/professionals/infection control/mask guidance
Handwashing is essential!
We could stay in bubbles to protect ourselves
To prevent Flu transmission

- Get a flu and pneumococcal vaccination
- Avoid sick people
- Stay home when ill
- Practice and encourage appropriate personal hygiene habits
  - Cover coughs and sneezes
  - Use disposable tissues
  - Wash hands use ETOH sanitizer
### Appendix 2. Hospital Preparedness Checklist

<table>
<thead>
<tr>
<th>Preparedness Subject</th>
<th>Actions Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Structure for planning and decision making</td>
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<tr>
<td>• An internal, multidisciplinary planning committee for influenza preparedness has been created.</td>
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<tr>
<td>• A person has been designated as the influenza preparedness coordinator.</td>
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<tr>
<td>(Insert name)</td>
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<tr>
<td>• Members of the planning committee include the following hospital staff members (insert names)</td>
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<tr>
<td>- Administration</td>
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<td>- Legal counsel</td>
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<td>- Infection control</td>
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<td>- Hospital disaster coordinator</td>
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<td>- Risk management</td>
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<td>- Facility engineering</td>
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<td>- Nursing administration</td>
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<td>- Medical staff</td>
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<td>- Intensive care</td>
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<td>- Emergency Department</td>
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<td>- Laboratory services</td>
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<tr>
<td>- Respiratory therapy</td>
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<td>- Psychiatry</td>
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<td>- Environmental services</td>
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<td>- Public relations</td>
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<td>- Security</td>
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<td>- Materials management</td>
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<td>- Staff development</td>
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<td>- Occupational health</td>
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<tr>
<td>- Diagnostic imaging</td>
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<tr>
<td>- Pharmacy</td>
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<tr>
<td>- Information technology</td>
<td></td>
</tr>
</tbody>
</table>
Have you planned to vaccinate all employees?
Are your staff protected?
BIRD FLU EXPERTS

Tick... Tick... Tick...
Considerations

• Staffing *(Nurses, ancillary staff, physicians)*
• Respiratory and hand hygiene practices
• Disinfection of the environment
• Availability of supplies, PPE etc
Considerations

• Availability of vaccine
• Availability of antiviral medication
• Availability of ventilators
• Food and other supplies
Considerations

- Surge capacity
- Lab capacity
- Morgue capacity
Considerations

• Community issues (what else is going on)

• Widespread illness in communities will lead to essential personnel shortages: teachers, military, police, fireman, utility and transportation workers, etc.
Resources

• CDC website: www.cdc.gov/od/nvpo/pandemics
• CSTE website: www.cste.org
• DSHS Influenza website: www.idcu.org
• National pan flu site: www.pandemicflu.gov
• Center for Infectious Disease Research and Policy www.cidrap.umn.edu
  Avian flu: http://www.CDC.gov/flu/professionals/infect-control-htm
• Mask guidance: http://www.CDC.gov/flu/professionals/infection
Conclusion

• The next flu pandemic will cause “lots” of people to get sick and many of them to die
• Resources will be overwhelmed
• We may have very little warning, so…
• State and local planning is essential!!!
When the flu hits the fan