**Seasonal Influenza**
- Not novel strain
- Herd immunity
- Vaccine from previous year
- 36,000 US deaths/year
- 200,000 US hospital admissions/year
- $37 Billion annual economic impact

**Pandemic Influenza**
- Novel strain
- Mutation of strain from animal reservoir
- No herd immunity
- No vaccine
- May have high or low pathogenicity

**Influenza Pandemics: 20th Century**
- 1918: “Spanish Flu”
  - A(H1N1)
  - 50-100 M deaths
  - 675,000 US deaths
- 1957: “Asian Flu”
  - A(H2N2)
  - 1-4 M deaths
  - 70,000 US deaths
- 1968: “Hong Kong Flu”
  - A(H3N2)
  - 1-4 M deaths
  - 34,000 US deaths

**The Spanish Flu Pandemic of 1918**
- Killed more people than any other disease in history
- Unusually high attack rates among young and otherwise healthy adults (i.e., soldiers)
- Appeared in February 1918 and spread rapidly through the spring

**The Second Wave**
- First wave—Disappeared in the early summer
- Second wave—Appeared in August 1918
  - Mutated to an exceptionally lethal variation
  - Death sometimes occurred in 24 hours or less
  - Over 90% of the deaths occurred during the second wave
Fatality Surge

Death Rates in the U.S. by Month
(per 1,000 population)

I think Bob’s got a cold…

Fatality Surge

H5N1 60% Mortality

Novel H1N1 – Not the virus we expected.

So why all the fuss?

Influenza virus mutates rapidly. Rate of spread, severity of infection and antigenicity can change abruptly. Influenza is unpredictable.

Because there is no herd immunity, massive numbers may become ill in a short period of time - could overwhelm health care resources.

Social activity and commerce can become paralyzed as the population practices “social distancing.”

Size Matters
**Novel H1N1 as a Threat to Children**

- Estimates are based on extrapolation from past pandemics in the United States. Note that these estimates do not include the potential impact of interventions not available during the 20th century pandemics.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Moderate (1957/68-like)</th>
<th>Severe (1918-like)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illness</td>
<td>90 million (30%)</td>
<td>90 million (30%)</td>
</tr>
<tr>
<td>Outpatient medical care</td>
<td>45 million (50%)</td>
<td>45 million (50%)</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>865,000</td>
<td>9,900,000</td>
</tr>
<tr>
<td>Intensive Care Unit (ICU)</td>
<td>128,750</td>
<td>1,485,000</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>64,875</td>
<td>742,500</td>
</tr>
<tr>
<td>Deaths</td>
<td>209,000</td>
<td>1,903,000</td>
</tr>
</tbody>
</table>

*Estimates are based on extrapolation from past pandemics in the United States. Note that these estimates do not include the potential impact of interventions not available during the 20th century pandemics.

**Mortality projections are historical…**

**Treatment will greatly influence outcome…**

**Sick with Flu vs Dead from Flu**

- **Vaccine**
- **Antiviral**
- **Antibiotics**
- **Oxygen**
- **Ventilators**
- **Personnel**
- **Organization**
- **Facilities**
- **Supplies**

**Basic Pandemic Hospital Missions**

- Treat those who need services
- Maintain a functional facility

Government agencies will not prepare individual hospitals to meet the challenge. That will be our responsibility…
H1N1 Update

H1N1 Pandemic of 2009

April, 2009 epidemic recognized in Mexico
June 11, 2009 pandemic declared by WHO
Outbreaks in > 100 countries
Not closely related to seasonal or 1918 H1N1
As of July 24 in USA: 43,771 cases; 5,011 hospitalizations; 302 deaths
Reports from South American winter: lots of cases, low mortality
Epidemic now beginning in South Central USA

Number of confirmed cases (N = 1,882) of novel influenza A (H1N1) virus infection worldwide, May 6, 2009

International Co-circulation of 2009 H1N1 and Seasonal Influenza
Influenza Activity Sept 6-12

- 18.3% of specimens tested were positive
- 99% of subtyped strains (49.4%) were A/H1N1
- 20% of non-H1N1 are a new H3N2
- ILI exceeds threshold in most areas
- Influenza deaths below epidemic threshold
- Two reported pediatric deaths, both H1N1

Pediatric H1N1 Deaths by Age Group

Deaths by History of Antiviral Therapy

- Antiviral therapy  | Deaths (n) | Per cent of all
- None            | 12        | 39
- < 2 days from onset of illness | 4 | 13
- > 2 days from onset of illness | 12 | 39
- Unknown        | 5         | 14

Pediatric H1N1 Deaths by Risk Group

Bacterial Co-infection in H1N1 Deaths

- Cultures (blood, lung) obtained in 23 cases
- 10/23 (43%) tested had positive cultures
- 3 MRSA
- 2 MSSA
- 3 Streptococcus pneumoniae
- 1 Streptococcus pyogenes
- 1 other strep

WHO: What Can I do?

- avoid touching your mouth and nose;
- clean hands thoroughly with soap and water, or cleanse them with an alcohol-based hand rub on a regular basis (especially if touching the mouth and nose, or surfaces that are potentially contaminated);
- avoid close contact with people who might be ill;
- reduce time spent in crowded settings if possible;
- improve airflow in living space by opening windows;
- practice good health habits including adequate sleep, nutritious food, and keeping physically active.
**CDC Recommendations**

Cover your nose and mouth with a tissue when you cough or sneeze. Throw the tissue in the trash after you use it.

Wash your hands often with soap and water, especially after you cough or sneeze. Alcohol-based hand cleaners* are effective.

Avoid touching your eyes, nose or mouth. Germs spread this way.

Try to avoid close contact with sick people.

If you are sick with flu-like illness, CDC recommends that you stay home for at least 24 hours after your fever is gone except to get medical care or for other necessities. (Your fever should be gone without the use of a fever-reducing medicine.) Keep away from others as much as possible.

---

**Function of Facemasks**

- Facemasks help stop droplets from being spread by the person wearing them.
- They also keep splashes or sprays from reaching the mouth and nose of the person wearing the facemask.
- They are not designed to protect against breathing in very small particle aerosols that may contain viruses.
- Facemasks should be used once and then thrown away in the trash.

---

**N95 Respirators**

Use of N95 respirators or facemasks generally is not recommended for workers in non-healthcare occupational settings for general work activities.

- For specific work activities that involve contact with people who have ILI, such as escorting a person with ILI, interviewing a person with ILI, providing assistance to an individual with ILI, the following are recommended:
  - workers should try to maintain a distance of 6 feet or more from the person with ILI;
  - workers should keep their interactions with ill persons as brief as possible;
  - the ill person should be asked to follow good cough etiquette and hand hygiene and to wear a facemask, if able, and one is available;
  - workers at increased risk of severe illness from influenza infection should avoid people with ILI (possibly by temporary reassignment);
  - where workers cannot avoid close contact with persons with ILI, some workers may choose to wear a facemask or N95 respirator on a voluntary basis.

---

**Infection Control**

- Private room, door closed
- Aerosol generation mandates negative pressure room
- Masks for most HCW, N95 for close contact
- Screen visitors, restrict to essential
- Isolation maintained for 7 days or symptoms resolved, whichever is longer
- Ill HCW excluded for same interval

---

**Should I go to work if I have the flu but am feeling OK?**

No. Whether you have influenza A(H1N1) or a seasonal influenza, you should stay home and away from work through the duration of your symptoms.

This is a precaution that can protect your work colleagues and others.

---

**Masks and Respirator (Masks)**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Wearer not high risk</th>
<th>Wearer high risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupational (non-health care)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No novel H1N1 in community</td>
<td>Facemask/respirator not recommended</td>
<td>Facemask/respirator not recommended</td>
</tr>
<tr>
<td>Novel H1N1 in community</td>
<td>Facemask/respirator not recommended but could be considered under certain circumstances</td>
<td>Facemask/respirator not recommended but could be considered under certain circumstances</td>
</tr>
</tbody>
</table>

**Occupational (health care)**

- Caring for persons with known, probable or suspected novel H1N1 or influenza-like illness

  - Respirator
  - Consider temporary reassignment. Respirator
### Persistence of Positive PCR or Culture

- **Graph:** Persistence of positive PCR or culture over days 4 to 7 after onset of symptoms.

  - All PCR
  - All culture
  - Untreated PCR
  - Untreated culture
  - Treated PCR
  - Treated culture

  **Legend:**
  - Red: All PCR
  - Green: All culture
  - Blue: Untreated PCR
  - Purple: Untreated culture
  - Pink: Treated PCR
  - Orange: Treated culture

  **X-axis:** Day after onset of symptoms
  - Day 4
  - Day 5
  - Day 6
  - Day 7

  **Y-axis:** Percent positive
  - 0
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70
  - 80
  - 90
  - 100

  **Source:** Lee, J Infect Dis, 2009

### WHO Recommended Influenza Therapy

- **“Illness” implies progressive or severe symptoms requiring hospitalization**
- **Oseltamivir 75-150 mg BID until improved**
- **Zanamavir if TamiFlu resistance, not available**
- **Treat if influenza strongly suspected, not waiting for laboratory confirmation**
- **When > 1 type circulating, consider using oseltamivir and M2 inhibitor**

### WHO Guidelines for Treatment of H1N1

<table>
<thead>
<tr>
<th>High risk</th>
<th>Severe illness</th>
<th>Treat</th>
<th>Rec. strength</th>
<th>Evidence quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>ASAP</td>
<td>S</td>
<td>L</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>ASAP</td>
<td>S</td>
<td>VL</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>Consider</td>
<td>S</td>
<td>VL</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>ASAP</td>
<td>S</td>
<td>VL</td>
</tr>
</tbody>
</table>

**WHO:** August 27, 2009

### WHO Recommended Influenza Chemoprophylaxis

<table>
<thead>
<tr>
<th>High risk</th>
<th>Risk of transmission</th>
<th>Prophylaxis</th>
<th>Strength</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>High</td>
<td>Consider</td>
<td>Weak</td>
<td>Mod</td>
</tr>
<tr>
<td>Yes</td>
<td>Low</td>
<td>Consider</td>
<td>Weak</td>
<td>Mod</td>
</tr>
<tr>
<td>No</td>
<td>High</td>
<td>Not needed</td>
<td>Weak</td>
<td>Low</td>
</tr>
<tr>
<td>No</td>
<td>Low</td>
<td>Not needed</td>
<td>Weak</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Antiviral Resistance Among Circulating Strains

<table>
<thead>
<tr>
<th>Strain</th>
<th>Number tested</th>
<th>Resistant Number tested</th>
<th>Resistant Oseltamivir</th>
<th>Resistant Amantidine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal H1N1</td>
<td>1,148</td>
<td>1,143 (99)*</td>
<td>1153</td>
<td>6 (0.5)</td>
</tr>
<tr>
<td>A/H3N2</td>
<td>261</td>
<td>0</td>
<td>261</td>
<td>261 (100)</td>
</tr>
<tr>
<td>B</td>
<td>654</td>
<td>0</td>
<td>NT</td>
<td>NT</td>
</tr>
<tr>
<td>2009 H1N1</td>
<td>1,497</td>
<td>8 (0.6)*</td>
<td>526</td>
<td>526 (100)</td>
</tr>
</tbody>
</table>

* All strains sensitive to zanamavir

### Oseltamivir Dosing

<table>
<thead>
<tr>
<th>Medication</th>
<th>Treatment (5 days)</th>
<th>Chemoprophylaxis (10 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oseltamivir</td>
<td>Adults</td>
<td>Children 2-12 months</td>
</tr>
<tr>
<td></td>
<td>75-mg capsule twice per day</td>
<td>75-mg capsule once per day</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body Weight</th>
<th>Medication</th>
<th>Treatment</th>
<th>Chemoprophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤15 kg</td>
<td>Adults</td>
<td>30 mg twice daily</td>
<td>30 mg once per day</td>
</tr>
<tr>
<td>&gt;15 kg to 23 kg</td>
<td></td>
<td>45 mg twice daily</td>
<td>45 mg once per day</td>
</tr>
<tr>
<td>&gt;23 kg to 40 kg</td>
<td></td>
<td>60 mg twice daily</td>
<td>60 mg once per day</td>
</tr>
<tr>
<td>&gt;40 kg</td>
<td>Children</td>
<td>75 mg twice daily</td>
<td>75 mg once per day</td>
</tr>
<tr>
<td>≤33 lbs</td>
<td></td>
<td>30 mg twice daily</td>
<td>30 mg once per day</td>
</tr>
<tr>
<td>&gt;33 lbs to 51 lbs</td>
<td></td>
<td>45 mg twice daily</td>
<td>45 mg once per day</td>
</tr>
<tr>
<td>&gt;51 lbs to 88 lbs</td>
<td></td>
<td>60 mg twice daily</td>
<td>60 mg once per day</td>
</tr>
<tr>
<td>&gt;88 lbs</td>
<td></td>
<td>75 mg twice daily</td>
<td>75 mg once per day</td>
</tr>
</tbody>
</table>
FDA Approves H1N1 Vaccines

- HHS Secretary Kathleen Sebelius announced that the FDA has approved H1N1 vaccines made by CSL Limited, MedImmune LLC, Novartis Vaccines and Diagnostics Limited, and Sanofi Pasteur Inc.
- …some vaccine might arrive by the first week in October, with ‘ample supplies’ by mid-October.

FluMist First to Market

- The CBS Evening News (9/21, story 6, 1:20, Couric) reported the “3.4 million vaccine doses that will be delivered in early October…will all be in spray form.”
- for children ages two and up who are healthy and should not be given to children with asthma or underlying medical conditions.

CDC Emphasis for H1N1 Vaccination

- All those 6 months to 24 years
- Pregnant women
- Caregivers for those < 6 months old
- Health care and ER medical service workers
- Those 25-64 YO with high risk conditions (DM, renal, neuromuscular, SS, hepatic, heart or lung disease, immunocompromised)

Response to H1N1 vaccine in Children

- Per cent responding
- Age of vaccine recipient

Summary

- H1N1 will be prominent soon
- Prominent in young adults & adolescents
- Mortality low, especially in those > 55 YO
- Oseltamivir (zanamavir) recommended for treating those in high risk categories
- Weak recommendations for prophylaxis
- Gowns, masks, goggles of limited utility
- < 10YO will need two doses of vaccine
Erie County Sponsored Community H1N1 Vaccination Points of Distribution (PODs)

Anthony J. Billittier, IV MD
Erie County Commissioner of Health
Women and Children’s Hospital of Buffalo
Grand Rounds
September 25, 2009

Topics
- H1N1 Update
- What the public health system will do
- Erie County Sponsored Community H1N1 PODs
- Discussion

Local Data
Confirmed Novel H1N1 Cases by Age

Number of Confirmed H1N1 Cases

We Can't Predict Mother Nature
ICS Structure

Operations

Epi NPI PI Mass Care Mass Fatality COOP

Historical Perspective

- February 2008 - Hepatitis A POD
- 10,153 vaccinations in 5 days
- Assisted by NYSDOH, other local health departments, & volunteers
- Brought us to our knees

Vaccination Priority Groups

Advisory Committee on Immunization Practices (ACIP) met July 29, 2009 and set priority groups.

Initial Target Groups:
- Pregnant Women
- Household & caregiver contacts children <6 months old
- Healthcare workers including emergency medical services personnel
- Persons 6 months through 24 years of age
- Persons 25 through 64 years of age with high risk medical conditions

Do the Math...

- 462,000 persons in H1N1 vaccination priority groups
- 46 times the Hep A challenge
- 46 x 5 days = 230 days
- Starting mid October, we’ll be lucky to finish by the end of the school year!

Our Approach

- Erie County Supported vaccination efforts
  - Primary and preferred delivery mechanism
  - All current healthcare providers
    - Physicians
    - Hospitals
    - Clinics
    - Mass Vaccinators
    - Pharmacies
    - College Health Centers
    - K-12 School-based health centers
    - Occupational Medicine providers
- Erie County Sponsored vaccination efforts

Erie County Sponsored Community H1N1 PODs

- Shared effort and responsibility between Erie County and each community
  - Erie County will provide program “umbrella” including operational oversight, logistical support, technical assistance, medical consultation, emergency operations center support & vaccination strike teams
  - Communities will provide local leadership (especially emergency managers and school districts) and POD infrastructure
Prioritization of Target Groups

- Pregnant Women
- Household & caregiver contacts children (≤ 6 months old)
- Healthcare workers including emergency medical services personnel
- Persons 6 months through 24 years of age
- Persons 25 through 64 years of age with high risk medical conditions

Media

- Must present a clear message
- Joint Information Center will be established

As more information becomes available we will keep you informed.

Thank You!

Questions???????
National and Regional Summary of Select Surveillance Components

FluView

www.cdc.gov

Howard Faden

9/25/09

U.S. Virologic Surveillance

Positive specimens by type/subtype

<table>
<thead>
<tr>
<th></th>
<th>Nation</th>
<th>New York</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza A</td>
<td>1,374</td>
<td>679</td>
</tr>
<tr>
<td>(2009 H1N1)</td>
<td>(99.7%)</td>
<td>(48.4%)</td>
</tr>
<tr>
<td>A (sub typing not performed)</td>
<td>693 (50.4%)</td>
<td></td>
</tr>
<tr>
<td>A (unable to subtype)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>A (H3)</td>
<td>2 (0.1%)</td>
<td></td>
</tr>
<tr>
<td>A (H1)</td>
<td>4 (0.3%)</td>
<td></td>
</tr>
</tbody>
</table>

99% of all sub typed influenza A viruses being reported to CDC this week were 2009 influenza (H1N1) viruses.

National and Regional Flu Surveillance

Resident Deaths

<table>
<thead>
<tr>
<th>Surveillance Regions</th>
<th>Sept. 12 Week 36</th>
<th>Cumulative for the Season</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive For Flu</td>
<td>Positive A (H1N1)</td>
</tr>
<tr>
<td>Nation</td>
<td>16.2%</td>
<td>6,196</td>
</tr>
<tr>
<td>New York</td>
<td>10.5%</td>
<td>280</td>
</tr>
</tbody>
</table>

Antiviral Resistance

Resistant Viruses, No. (%)

<table>
<thead>
<tr>
<th></th>
<th>Oseltamivir (Tamiflu)</th>
<th>Zanamivir (Relenza)</th>
<th>Adamantanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza A (H1N1)</td>
<td>0 (0.6)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Influenza A (H3N2)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Influenza B</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>S09 Influenza A</td>
<td>0 (0.6)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>