Seasonal Influenza

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Disclosures

• No support
• One off-label recommendation
Objectives

• Discuss why seasonal influenza is so important
• Review the epidemiology and biology of the virus in order to understand illness prevention and treatment
• Discuss the recommendations for prevention and treatment, highlighting the changes this year
Early in the morning of March 11, 1918, a young private reported to the Army hospital at Fort Riley, Kansas, complaining of fever, sore throat, and headache. Then, another sick soldier appeared, then another and another. By noon, the hospital had more than one hundred cases; in a week, there were five hundred. Forty-eight soldiers died at Fort Riley that spring. No one knew why.

"Influenza 1918" is the story of the worst epidemic the United States has ever known. Before it was over, the flu would kill more than 600,000 Americans--more than all the American combat deaths in the 20th century.
Influenza: Morbidity and Mortality

- 55,000-431,000 hospitalizations per year
- 5,000-49,000 influenza-associated deaths per year

MMWR: Prevention and Control of Influenza With Vaccines, Sept 20, 2013
Age Distribution for Acute Respiratory Disease Hospitalizations and Pneumonia & Influenza Mortality: Typical Epidemic Years

MMWR, 2008
Influenza Epidemics

- Epidemic years 10% of the un-immunized population affected
- Pandemic years 40% of the population affected
- Typical epidemic lasts 6 weeks
- Winter months (Dec-March in northern hemisphere)
- Children usually affected first in epidemics
Influenza Virus Types

• Influenza A, B and C
  - distinguished by their nucleoprotein (NP) and matrix protein (M)

• Two types cause epidemic illness, A and B
  - A type broken into subtypes based on hemagglutinin and neuraminidase surface glycoproteins
  - B type has no subtypes

• C type does not cause epidemic illness
Understanding Influenza (Flu) Infection: An Influenza Virus Binds to a Respiratory Tract Cell

After influenza viruses enter the human body, they attach to cells within the nasal passages and throat (i.e., the respiratory tract). The hemagglutinin (HA) surface proteins of the influenza virus bind to the sialic acid receptors on the surface of a human cell like a key to a lock. The influenza virus is then able to enter and infect the cell. This marks the beginning of a flu infection.
Antigenic Drift

- RNA
- Hemagglutinin
- Neuraminidase
- Antibodies
- Sialic acid
Antigenic Shift
Reassortment
Genetic Evolution of H7N9 Virus in China, 2013

Setting: Habitats shared by wild and domestic birds and/or live bird/poultry markets
Influenza Control

• Prevention
  – Vaccination
  – Hand Hygiene/Cough Etiquette
  – Social Distancing and Cohorting
  – Chemoprophylaxis

• Treatment
  – Neuraminidase Inhibitors
  – M2 Blockers
Seasonal Influenza Vaccination

- All persons $\geq 6$ mos. of age
- As soon as vaccine is available
- Optimal time Oct 1 – Nov 15$^{\text{th}}$ (Peak immunity conferred from 2 weeks to 6 mos.)
- Continue vaccinating throughout the influenza season
- Administer prior to travel to equatorial regions and to southern hemisphere in April-September
Overview of Changes from 2012-13 to 2014-15

• Significant changes/additions re: vaccines
  • New nomenclature abbreviations
  • A number of new vaccine products
  • Management of individuals with egg allergy
  • Virus composition of the 2014-15 vaccine
  • High dose Vaccine
Efficacy of High-Dose vs. Standard-Dose Influenza Vaccine in Adults

NEJM 2014;371: 635-45

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>IIV3-HD (N=15,990)</th>
<th>IIV3-SD (N=15,993)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female sex — no. (%)</td>
<td>9,131 (57.1)</td>
<td>8,963 (56.0)</td>
</tr>
<tr>
<td>Mean age — yr</td>
<td>73.3±5.8</td>
<td>73.3±5.8</td>
</tr>
<tr>
<td>Racial background — no. (%)†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>15,103 (94.4)</td>
<td>15,167 (94.8)</td>
</tr>
<tr>
<td>Asian</td>
<td>118 (0.7)</td>
<td>105 (0.7)</td>
</tr>
<tr>
<td>Black</td>
<td>670 (4.2)</td>
<td>612 (3.8)</td>
</tr>
<tr>
<td>Other</td>
<td>97 (0.6)</td>
<td>106 (0.7)</td>
</tr>
<tr>
<td>Hispanic ethnic group — no. (%)†</td>
<td>958 (6.0)</td>
<td>982 (6.1)</td>
</tr>
<tr>
<td>At least one prespecified chronic coexisting condition — no. (%)‡</td>
<td>10,750 (67.2)</td>
<td>10,752 (67.2)</td>
</tr>
<tr>
<td>At least two prespecified chronic coexisting conditions — no. (%)‡</td>
<td>5,385 (33.7)</td>
<td>5,403 (33.8)</td>
</tr>
<tr>
<td>Cardiac and respiratory disorders — no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>2,735 (17.1)</td>
<td>2,732 (17.1)</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>1,103 (6.9)</td>
<td>1,112 (7.0)</td>
</tr>
<tr>
<td>Valvular heart disease</td>
<td>744 (4.6)</td>
<td>741 (4.6)</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>451 (2.8)</td>
<td>446 (2.8)</td>
</tr>
<tr>
<td>Chronic obstructive lung disease</td>
<td>1,500 (9.4)</td>
<td>1,495 (9.4)</td>
</tr>
<tr>
<td>Asthma</td>
<td>1,415 (8.8)</td>
<td>1,408 (8.8)</td>
</tr>
<tr>
<td>Received influenza vaccine the previous season — no. (%)</td>
<td>11,758 (73.5)</td>
<td>11,773 (73.6)</td>
</tr>
</tbody>
</table>
Efficacy of High-Dose vs. Standard-Dose Influenza Vaccine in Adults
NEJM 2014;371: 635-45

<table>
<thead>
<tr>
<th></th>
<th>#</th>
<th>Confirmed Illness</th>
<th>SAE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Dose</td>
<td>15,991</td>
<td>301</td>
<td>9.0</td>
</tr>
<tr>
<td>High Dose</td>
<td>15,998</td>
<td>228</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

* Not immediately related to vaccination
Influenza Vaccine Nomenclature Since 2013-14

- TIV (Trivalent Inactivated Influenza Vaccine) = IIV (Inactivated Influenza Vaccine)
  - IIV includes egg and cell culture-based inactivated vaccines
  - IIV includes trivalent (IIV3) and quadrivalent (IIV4)
  - Cell culture-based IIV is referred to as ccIIV3
- RIV = recombinant influenza vaccine (RIV3)
- LAIV = Live Attenuated Influenza Vaccine (LAIV4)
FluBlok® (RIV3)

- Approved for persons aged 18 through 49 years
- Vaccine contains recombinant influenza virus hemagglutinin Protein is produced in insect cell line
- No eggs or influenza viruses used in production
- Available in 0.5mL single-dose vials for IM injection
- Egg-free
Quadrivalent Influenza Vaccines Rationale

- Two lineages of influenza B viruses: Victoria and Yamagata
  - Immunization against virus from one lineage provides only limited cross-protection against viruses in the other
- Trivalent vaccines contain only one B vaccine virus
  - Only one B lineage is represented
- Predominant lineage is difficult to predict in advance of the season
- Quadrivalent vaccines contain one virus from each B lineage
<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Trade Name</th>
<th>Manufacturer</th>
<th>Presentation</th>
<th>Mercury content (mcg Hg/0.5 mL)</th>
<th>Ovalbumin Content (mcg/ 0.5 mL dose)</th>
<th>Age indication</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactivated Influenza Vaccine, Trivalent (IIV3)</td>
<td>Afluria®</td>
<td>CSL Limited</td>
<td>0.5 mL PFS</td>
<td>0.0</td>
<td>≤ 1</td>
<td>≥ 9 yrs&lt;sup&gt;6&lt;/sup&gt;</td>
<td>$11.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.0 mL MDV</td>
<td>24.5</td>
<td></td>
<td></td>
<td>10.25</td>
</tr>
<tr>
<td></td>
<td>Fluarix®</td>
<td>GSK</td>
<td>0.5 mL PFS</td>
<td>0.0</td>
<td>≤ 0.05</td>
<td>≥ 3 yrs</td>
<td>10.98</td>
</tr>
<tr>
<td></td>
<td>Flucelvax®&lt;sup&gt;8&lt;/sup&gt;</td>
<td>Novartis</td>
<td>0.5 PFS</td>
<td>0.0</td>
<td>See Footnote 7</td>
<td>≥ 18 yrs</td>
<td>18.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.0 mL MDV</td>
<td>&lt; 25.0</td>
<td>≤ 1</td>
<td>≥ 3 yrs</td>
<td>9.50</td>
</tr>
<tr>
<td>Standard Dose</td>
<td>FluLaval®</td>
<td>ID Biomedical (distributed by GSK)</td>
<td>5.0 mL MDV</td>
<td>&lt; 25.0</td>
<td>≤ 1</td>
<td>≥ 3 yrs</td>
<td>9.50</td>
</tr>
<tr>
<td></td>
<td>Fluvirin®</td>
<td>Novartis</td>
<td>0.5 mL PFS</td>
<td>≤ 1</td>
<td>≤ 1</td>
<td>≥ 4 yrs</td>
<td>14.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.0 mL MDV</td>
<td>25.0</td>
<td></td>
<td></td>
<td>13.25</td>
</tr>
<tr>
<td></td>
<td>Fluzone®</td>
<td>Sanofi Pasteur</td>
<td>0.25 PFS</td>
<td>0.0</td>
<td>0.025 mcg/ 0.25 mL</td>
<td>6 - 35 mos</td>
<td>15.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5 mL PFS</td>
<td>0.0</td>
<td>0.05</td>
<td>≥ 36 mos</td>
<td>12.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5 mL SDV</td>
<td>0.0</td>
<td>0.05</td>
<td>≥ 36 mos</td>
<td>13.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.0 mL MDV</td>
<td>25.0</td>
<td>0.05</td>
<td>≥ 6 mos</td>
<td>10.69</td>
</tr>
<tr>
<td></td>
<td>Fluzone®&lt;sup&gt; Intradermal&lt;/sup&gt;</td>
<td>Sanofi Pasteur</td>
<td>0.1 mL prefilled microinjection</td>
<td>0.0</td>
<td>0.02 mcg/ 0.1 mL</td>
<td>18-64 yrs</td>
<td>16.72</td>
</tr>
<tr>
<td>Vaccine</td>
<td>Trade Name</td>
<td>Manufacturer</td>
<td>Presentation</td>
<td>Mercury content (mcg Hg/0.5 mL)</td>
<td>Ovalbumin Content (mcg/0.5 mL dose)</td>
<td>Age indication</td>
<td>Cost</td>
</tr>
<tr>
<td>------------------</td>
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</tr>
<tr>
<td>IIV3 High Dose</td>
<td>Fluzone® High Dose³</td>
<td>Sanofi Pasteur</td>
<td>0.5 mL PFS</td>
<td>0.0</td>
<td>0.1</td>
<td>≥ 65 yrs</td>
<td>28.04</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactivated Quadrivalent (IIV4)</td>
<td>Fluarix® Quadrivalent</td>
<td>GSK</td>
<td>0.5 mL PFS</td>
<td>0.0</td>
<td>≤ 0.05</td>
<td>≥ 3 yrs</td>
<td>15.90</td>
</tr>
<tr>
<td></td>
<td>Fluzone® Quadrivalent</td>
<td>Sanofi Pasteur</td>
<td>0.25 PFS</td>
<td>0.0</td>
<td>0.025 mcg/0.25 mL</td>
<td>6 - 35 mos</td>
<td>20.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5 mL PFS</td>
<td>0.0</td>
<td>0.05</td>
<td>≥ 36 mos</td>
<td>17.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5 mL SDV</td>
<td>0.0</td>
<td>0.05</td>
<td>≥ 36 mos</td>
<td>17.15</td>
</tr>
<tr>
<td></td>
<td>FluLaval® (distributed by GSK)</td>
<td>ID Biomedical</td>
<td>5.0 mL MDV</td>
<td>&lt; 25.0</td>
<td>≤ 0.3</td>
<td>≥ 3 yrs</td>
<td>15.15</td>
</tr>
<tr>
<td>Vaccine</td>
<td>Trade Name</td>
<td>Manufacturer</td>
<td>Presentation</td>
<td>Mercury content (mcg Hg/0.5 mL)</td>
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<td>Age indication</td>
<td>Cost</td>
</tr>
<tr>
<td>-------------------------------</td>
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<td>----------------------</td>
<td>-----------------------------</td>
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<td>--------------------------------------</td>
<td>------------------</td>
<td>-------</td>
</tr>
<tr>
<td>New!</td>
<td>FluBlok®</td>
<td>Protein Sciences</td>
<td>0.5 mL SDV</td>
<td>0.0</td>
<td>0.0</td>
<td>18 - 49 yrs</td>
<td>32.00</td>
</tr>
<tr>
<td>Recombinant Trivalent (RIV3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live-attenuated Quadrivalent (LAIV4)</td>
<td>FluMist®</td>
<td>MedImmune</td>
<td>0.2 mL prefilled intranasal sprayer</td>
<td>0.0</td>
<td>Insufficient data</td>
<td>2 – 49 yrs, healthy, non-pregnant</td>
<td>21.70</td>
</tr>
</tbody>
</table>
Vaccines Produced via Non-Egg-Based Technologies

• May permit more rapid scale up of vaccine production (e.g., as might be needed during a pandemic)

• Two vaccines this season, both trivalent:
  • Cell culture-based (ccIIV3) (contains 50 femtograms ($5 \times 10^{-14}$ grams) of egg protein)
  • Recombinant hemagglutinin (RIV3) (no egg protein)
Influenza Vaccination for Persons with Egg Allergies 2011-12 and 2012-13

Can the individual eat lightly cooked egg (e.g., scrambled egg) without reaction?*†

- Yes → Administer vaccine per usual protocol
- No → After eating eggs or egg-containing foods, does the individual experience ONLY hives?

- Yes → Administer IIV Observe for reaction for at least 30 minutes following vaccination
- No → After eating eggs or egg-containing foods, does the individual experience other symptoms such as:
  - Cardiovascular changes (e.g., hypotension)
  - Respiratory distress (e.g., wheezing)
  - Gastrointestinal (e.g., nausea/vomiting)
  - Reaction requiring epinephrine
  - Reaction requiring emergency medical attention

- Yes → Refer to a physician with expertise in management of allergic conditions for further evaluation
- No → Administer vaccine per usual protocol
Influenza Vaccination for Persons with Egg Allergies 2013-14

Can the individual eat lightly cooked egg (e.g., scrambled egg) without reaction?

- Yes: Administer vaccine per usual protocol
- No: After eating eggs or egg-containing foods, does the individual experience ONLY hives?

- Yes: Administer RIV3, if patient aged 18 through 49 yrs.; OR
  - Administer IIV Observe for reaction for at least 30 minutes following vaccination
- No: After eating eggs or egg-containing foods, does the individual experience other symptoms such as:
  - Cardiovascular changes (e.g., hypotension)
  - Respiratory distress (e.g., wheezing)
  - Gastrointestinal (e.g., nausea/vomiting)
  - Reaction requiring epinephrine
  - Reaction requiring emergency medical attention

- Yes: Refer to a physician with expertise in management of allergic conditions for further evaluation and administration of IIV
- No: Administer RIV3, if patient aged 18 through 49 yrs.; OR
Flu vaccine dosing algorithm for children 6 months through 8 years of age, 2013-2014

Has the child ever received flu vaccine?

Yes

Did the child receive a total of >2 doses of seasonal flu vaccine since July 1, 2010?

Yes

Administer 1 dose

No/Don’t know

Administer 2 doses, at least 4 weeks apart.

No/Don’t know

Administer 2 doses, at least 4 weeks apart.
Components of the 2014-2015 Vaccine

Trivalent vaccines will contain:
• A/California/7/2009 (H1N1)-like virus,
• A/Texas/50/2012 (H3N2)-like virus, and
• B/Massachusetts/2/2012-like virus (Yamagata lineage).

Quadrivalent vaccines, will contain, in addition:
• A B/Brisbane/60/2008-like virus (Victoria lineage)
Influenza Control

• Prevention
  – Vaccination
  – Hand Hygiene/cough etiquette
  – Social distancing and cohorting
  – Chemoprophylaxis

• Treatment
  – Neuraminidase inhibitors
  – M2 Blockers
**Influenza Chemoprophylaxis**

- **Who**
  - NH patients if there is an index case in NH
  - Unimmunized at risk individuals in the community during epidemic*
  - Unimmunized household members with index case in household*
  - Unimmunized health care workers during epidemic**

- **Medications**
  - Neuraminidase inhibitors, Oseltamivir or Zanamivir
  - **not** M2 blockers, rimantadine or amanatidine (high resistance to recent isolates)

* Vaccinate and prophylaxis for 2 weeks
** Vaccinate and send home for 2 weeks
Influenza Symptoms

**Day 1-3**
- Fever (usually >101.5)
- Chills
- Myalgia
- Headache
- Fatigue
- Cough

**Day 1-7/10**
- Cough
- Fatigue
- Sore Throat +/-
Fig. 122. (a) Scanning electron micrograph of bronchial epithelium of a control calf showing a "carpet" of cilia periodically interrupted by the apices of adjacent nonciliated cells; × 3500. (b) Scanning electron micrograph of an equivalent area of bronchial epithelium 10 days post initial infection with PI3 virus; cilia have been lost and there is exposure of microvilli; × 4500.
Table 1. Influenza Virus Testing Methods

<table>
<thead>
<tr>
<th>Method1</th>
<th>Types Detected</th>
<th>Acceptable Specimens3</th>
<th>Test Time3</th>
<th>CLIA Waived</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viral cell culture (conventional)</td>
<td>A and B2</td>
<td>NP swab, throat swab, NP or bronchial wash, nasal or endotracheal aspirate, sputum</td>
<td>3-10 days</td>
<td>No</td>
</tr>
<tr>
<td>Rapid cell culture (shell vials; cell mixtures)</td>
<td>A and B2</td>
<td>As above</td>
<td>1-3 days</td>
<td>No</td>
</tr>
<tr>
<td>Immunofluorescence, Direct (DFA) or Indirect (IFA) Antibody Staining</td>
<td>A and B2</td>
<td>NP swab or wash, bronchial wash, nasal or endotracheal aspirate</td>
<td>1-4 hours</td>
<td>No</td>
</tr>
<tr>
<td>RT-PCR4 (singleplex and multiplex; real-time and other RNA-based)</td>
<td>A and B2</td>
<td>NP swab, throat swab, NP or bronchial wash, nasal or endotracheal aspirate, sputum</td>
<td>Varied (Generally 1-6 hours)</td>
<td>No5</td>
</tr>
<tr>
<td>Rapid Influenza Diagnostic Tests6</td>
<td>A and B</td>
<td>NP swab, (throat swab), nasal wash, nasal aspirate</td>
<td>&lt;30 min.</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

*High specificity (90-95%), but low sensitivity (40-70%). Therefore during influenza season a negative RIDT should not be used to make treatment decisions.
http://content.nejm.org/cgi/content/full/NEJMe0903992/DC1
Influenza Treatment

• Who
  – Hospitalized patients
  – Those with severe, complicated or progressive illness
  – Those at high risk for complications
  – Others – consider if in first 48 hours of illness

• Medications
  – Neuraminidase inhibitors, Oseltamivir or Zanamivir
  – not M2 blockers, rimantadine or amanatidine (high resistance to recent isolates)
High Risk

- < 2 years or ≥ 65
- Chronic disease
- Immunocompromised
- Pregnant or post partum (within 2 wks of delivery)
- < 19 yrs on long-term ASA
- American Indian/Alaska Natives
- Morbid obesity
- Nursing home residents
Treatment in Pregnancy

• Pregnant and Postpartum women, up to 2 weeks postpartum (including following pregnancy loss) should be treated.

• Oseltamivir is currently preferred.

• Duration of treatment is 5 days.

• Hospitalized patients with severe infections may require longer treatment and larger doses.

• Oseltamivir and zanamivir are FDA approved for treatment of influenza in pregnancy. While category C drugs, pregnancy is not a contraindication to treatment.
<table>
<thead>
<tr>
<th>Antiviral Agent</th>
<th>Activity Against</th>
<th>Use</th>
<th>Recommended For</th>
<th>Not Recommended for Use in</th>
<th>Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oseltamivir (Tamiflu®)</td>
<td>Influenza A and B</td>
<td>Treatment</td>
<td>Any age $^1$</td>
<td>N/A</td>
<td>Adverse events: nausea, vomiting. Sporadic, transient neuropsychiatric events (self injury or delirium) mainly reported among Japanese adolescents and adults.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chemoprophylaxis</td>
<td>3 months and older $^1$</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Zanamivir (Relenza®)</td>
<td>Influenza A and B</td>
<td>Treatment</td>
<td>7 yrs and older</td>
<td>people with underlying respiratory disease (e.g., asthma, COPD) $^2$</td>
<td>Allergic reactions: oropharyngeal or facial edema Adverse events: diarrhea, nausea, sinusitis, nasal signs and symptoms, bronchitis, cough, headache, dizziness, and ear, nose and throat infections</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chemoprophylaxis</td>
<td>5 yrs and older</td>
<td>people with underlying respiratory disease (e.g., asthma, COPD) $^2$</td>
<td></td>
</tr>
</tbody>
</table>
### Table 2. Recommended Dosage and Duration of Influenza Antiviral Medications for Treatment or Chemoprophylaxis

*(Current for the 2014-15 Influenza Season)*

<table>
<thead>
<tr>
<th>Antiviral Agent</th>
<th>Use</th>
<th>Children</th>
<th>Adults</th>
</tr>
</thead>
</table>
| Oseltamivir     | Treatment (5 days)   | If younger than 1 yr old: 3 mg/kg/dose twice daily<sup>2, 3</sup>  
If 1 yr or older, dose varies by child’s weight:  
15 kg or less, the dose is 30 mg twice a day  
>15 to 23 kg, the dose is 45 mg twice a day  
> 23 to 40 kg, the dose is 60 mg twice a day  
>40 kg, the dose is 75 mg twice a day | 75 mg twice daily          |
|                 | Chemoprophylaxis (7 days) | If child is younger than 3 months old, use of oseltamivir for chemoprophylaxis is not recommended unless situation is judged critical due to limited data in this age group.  
If child is 3 months or older and younger than 1 yr old: 3 mg/kg/dose once daily<sup>2</sup>  
If 1 yr or older, dose varies by child’s weight:  
15 kg or less, the dose is 30 mg once a day  
>15 to 23 kg, the dose is 45 mg once a day  
> 23 to 40 kg, the dose is 60 mg once a day  
>40 kg, the dose is 75 mg once a day | 75 mg once daily          |
| Zanamivir<sup>4</sup> | Treatment (5 days) | 10 mg (2 5-mg inhalations) twice daily *(FDA approved and recommended for use in children 7 yrs or older)* | 10 mg (2 5-mg inhalations) twice daily |  
Chemoprophylaxis (7 days) | 10 mg (2 5-mg inhalations) once daily *(FDA approved and recommended for use in children 5 yrs or older)* | 10 mg (2 5-mg inhalations) once daily |

1. Not FDA approved < 1 yr age but EAU approved
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Recommended duration for antiviral treatment is 5 days. Longer treatment courses for patients who remain severely ill after 5 days of treatment can be considered.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemo prophylaxis</td>
<td>Recommended duration is 7 days after exposure.</td>
</tr>
<tr>
<td></td>
<td>For control of outbreaks in long-term care facilities (e.g. elderly nursing homes) and hospitals, CDC recommends antiviral chemoprophylaxis for a minimum of 2 weeks, and continuing up to 1 week after the last known case was identified. Antiviral chemoprophylaxis should be considered, especially for elderly long-term care facilities, for all exposed residents, including those who have received influenza vaccination.</td>
</tr>
</tbody>
</table>
Summary

- Influenza causes significant morbidity and mortality
- Prevented by
  - Vaccination
  - Appropriate hygiene
  - Social distancing/cohorting
  - Appropriate prophylaxis
- Treatment in high risk and for others in first 48 hours with neuraminidase inhibitors