Influenza 101

Amy V. Groom, MPH
Cheyenne Jim, MS
What is Influenza?

• A contagious respiratory illness caused by influenza viruses

• Infects the nose, throat, and lungs.

• Causes mild to severe illness, and at times can lead to death.
  – Influenza is a leading cause of pneumonia

• Flu vaccination is the best way to prevent the flu
Influenza Virus Transmission

• Mainly from person to person through coughing or sneezing

• Touching something with flu viruses on it and then touching your mouth or nose

• You can pass on the flu to someone else even though you do not have any flu like symptoms
Communicability is highest 1-2 days before symptoms start and up to 4-5 days after onset of symptoms.
Effects of Influenza

• Severity of flu varies year to year
  – Virulence of the virus
  – Host factors (e.g. age, health conditions)

• 3,000 – 49,000 people die each year from influenza-related complications

• Over 200,000 people are hospitalized each year

• Flu is one of the leading causes of pneumonia
Influenza in AI/AN Populations

- AI/AN people are at high risk for influenza and influenza-related complications

- 2009 H1N1 pandemic – mortality rates 4x higher compared to other groups

- 1.5 - 2x mortality rate compared to whites in other years

- Influenza and Pneumonia one of the top ten leading causes of death for AI/AN people
Influenza Viruses

• There are three types of influenza viruses: A, B and C

• Human influenza A and B viruses cause seasonal epidemics almost every winter in the United States

• Influenza type C infections cause a mild respiratory illness
Influenza A

- Influenza A viruses can infect birds, animals and humans

- Influenza A viruses are divided into subtypes based on two proteins
  - Hemagglutinin (H)
  - Neuraminidase (N)

- 18 different hemagglutinin subtypes

- 11 different neuraminidase subtypes
AN INFLUENZA VIRUS

Source: CDC. http://www.cdc.gov/flu/images.htm
Influenza B

- Influenza B virus are only found in humans

- Two main lineages
  - B/Yamagata
  - B/Victoria
Influenza Virus Nomenclature

- The antigenic type (e.g., A, B, C)
- The host of origin (e.g., swine, equine, chicken, etc.)
  - For human-origin viruses, no host of origin designation is given.
- Geographical origin (e.g., Denver, Taiwan, etc.)
- Strain number (e.g., 15, 7, etc.)
- Year of isolation (e.g. 2009, etc.)
- For influenza A viruses, the hemagglutinin and neuraminidase antigen description in parentheses (e.g., (H1N1), (H5N1))
- For example:
  - A/duck/Alberta/35/76 (H1N1) for a virus from duck origin
  - A/Perth/16/2009 (H3N2) for a virus from human origin
Changes in Influenza Viruses

• Antigenic drift
  – Small changes in the genes of influenza viruses
  – Occur over time as the virus replicates
  – Drifted strains are usually closely related
  – Some cross protection
  – Both influenza A and B strains undergo antigenic drift
Changes in Influenza Viruses, cont.

• Antigenic Shift
  
  – Only occurs with Influenza A viruses
  
  – An abrupt, major change in the influenza A virus resulting in a new influenza A subtype or virus
  
  • New hemagglutinin and/or new hemagglutinin and neuraminidase
Antigenic shift initiates Pandemics

Figure II: Co-infection with human virus and non-human virus and the birth of a pandemic strain
Flu Vaccine Effectiveness

• Influenza vaccine effectiveness varies, depending on
  – Match between the vaccine influenza strains and the circulating strains
  – Patient factors (age, health status)
Adjusted vaccine effectiveness estimates for influenza seasons from 2005-2015

<table>
<thead>
<tr>
<th>Influenza Season†</th>
<th>Reference</th>
<th>Study Site(s)</th>
<th>No. of Patients‡</th>
<th>Adjusted Overall VE (%)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-05</td>
<td>Belongia 2009</td>
<td>WI</td>
<td>762</td>
<td>10</td>
<td>-36, 40</td>
</tr>
<tr>
<td>2005-06</td>
<td>Belongia 2009</td>
<td>WI</td>
<td>346</td>
<td>21</td>
<td>-52, 59</td>
</tr>
<tr>
<td>2006-07</td>
<td>Belongia 2009</td>
<td>WI</td>
<td>871</td>
<td>52</td>
<td>22, 70</td>
</tr>
<tr>
<td>2007-08</td>
<td>Belongia 2011</td>
<td>WI</td>
<td>1914</td>
<td>37</td>
<td>22, 49</td>
</tr>
<tr>
<td>2009-10</td>
<td>Griffin 2011</td>
<td>WI, MI, NY, TN</td>
<td>6757</td>
<td>56</td>
<td>23, 75</td>
</tr>
<tr>
<td>2010-11</td>
<td>Treanor 2011</td>
<td>WI, MI, NY, TN</td>
<td>4757</td>
<td>60</td>
<td>53, 66</td>
</tr>
<tr>
<td>2011-12</td>
<td>Ohmit 2014</td>
<td>WI, MI, PA, TX, WA</td>
<td>4771</td>
<td>47</td>
<td>36, 56</td>
</tr>
<tr>
<td>2012-13</td>
<td>McLean 2014</td>
<td>WI, MI, PA, TX, WA</td>
<td>6452</td>
<td>49</td>
<td>43, 55</td>
</tr>
<tr>
<td>2013-14</td>
<td>Unpublished</td>
<td>WI, MI, PA, TX, WA</td>
<td>5990</td>
<td>51</td>
<td>43, 58</td>
</tr>
<tr>
<td>2014-15</td>
<td>ACIP presentation, Flannery</td>
<td>WI, MI, PA, TX, WA</td>
<td>9329</td>
<td>23</td>
<td>14, 31</td>
</tr>
</tbody>
</table>

Source: CDC.
http://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm
2014-2015 Season

- Moderately severe influenza season

- H3N2 viruses predominated
  - H3N2 seasons associated with increased illness in the elderly

- Influenza B increases late in the season

- Majority of circulating H3N2 viruses were drifted from the H3N2 vaccine virus
  - Reduced protection against circulating influenza A H3N2 viruses
2015-2016 SEASON
Vaccines for the 2015-2016 Season

- A/California/7/2009 (H1N1)-like virus
- A/Switzerland/9715293/2013 (H3N2)-like virus
- B/Phuket/3073/2013-like (Yamagata lineage) virus
- Quadrivalent vaccines - B/Brisbane/60/2008-like (Victoria lineage) virus
- Changes in the 2 dose algorithm for children < 9 years
2 dose Algorithm for Children < 9 years

Has the child received ≥2 total doses of trivalent or quadrivalent influenza vaccine before July 1, 2015*

* The two doses need not have been received during the same season or consecutive seasons.

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6430a3.htm#fig1

Source: CDC.
Influenza Vaccine Products

- Inactivated influenza vaccine, quadrivalent (IIV4), standard dose
- Inactivated influenza vaccine, trivalent (IIV3), standard dose
- Inactivated influenza vaccine, trivalent (IIV3), high dose
- Inactivated influenza vaccine, trivalent, cell-culture-based (ccIIV3), standard dose
- Recombinant influenza vaccine, trivalent (RIV3), standard dose
- Live attenuated influenza vaccine, quadrivalent (LAIV4)
Vaccination Timing

• U.S. flu activity usually peaks between December and February

• CDC recommends that people receive their vaccine soon after vaccine becomes available, preferably by October.

• It takes about two weeks after vaccination for antibodies to develop in the body and provide protection against the flu
What about waning immunity?

- Vaccine-induced antibodies wane over time
- One study found a significant decline in antibody titers after 6 months among those aged ≥65 years
- Delaying vaccination might permit greater immunity later in the season, BUT
- Deferral might result in missed vaccination opportunities
- In the U.S, influenza typically peaks in December and January
HEALTHCARE PERSONNEL VACCINATION
I won’t spread flu to my patients or my family.

Even healthy people can get the flu, and it can be serious.

Everyone 6 months and older should get a flu vaccine. This means you.

This season, protect yourself—and those around you—by getting a flu vaccine.

For more information, visit: http://www.cdc.gov/flu
Reasons to vaccinate HCP

• Protect yourself
  – Reduces sick days by 28%\textsuperscript{1}

• Protect your family
  – If you are infected with influenza you will also expose your family

• PROTECT YOUR PATIENTS
  – Ethical imperative “First do no harm”

\textsuperscript{1} Infection Control & Hosp Epidemiology 2005:26:883
HCP Vaccination

- **Reasons for accepting vaccination:**
  - Protect self
  - Protect patients
  - Convenience
  - Peer influence
  - Prior positive experiences with receiving the flu vaccine

- **Reasons for rejecting vaccination:**
  - Concerns about vaccine safety or efficacy
  - Not at risk (healthy immune system)
  - Not at risk (do not understand transmission of influenza)
  - Fear of needles
  - Not convenient (real or perceived)

What facilities can do

• Identify an influenza vaccination coordinator

• Educate HCP in your facility about the importance of influenza vaccination
  – Provide information during staff trainings, new employee orientations, through email, posters in the facility, etc.

• Provide vaccine to all HCP in your facility
  – Free of charge
  – Convenient (multiple locations/times, mobile vaccination cart)

• Monitor coverage of your employees
  – Friendly competition between departments
Influenza vaccine questions and concerns
Addressing concerns

• Concern: Vaccine safety
  – You cannot get influenza from the vaccine
  – Vaccine is safe – allergic reactions are RARE
  – A sore arm is the most common adverse reaction
  – Persons with chronic illnesses CAN and SHOULD receive influenza vaccine
  – Pregnant women CAN and SHOULD receive influenza vaccine
Addressing concerns

• **Concern: Vaccine efficacy**
  
  – Flu vaccination can keep you from getting sick from flu and protects the people around you who are more vulnerable to serious flu illness
  
  – Flu vaccination also may make your illness milder if you do get sick
    
    • Can reduce the risk of more serious flu outcomes, like hospitalizations and deaths
  
  – When vaccine and circulating viruses are well matched, vaccine is very effective in healthy adults <65 years
  
  – Vaccine can provide cross protection against different, but related viruses²
Addressing concerns

• Concern: Not at risk (perception of having a healthy immune system)

  – In one study\(^1\), 23% of HCPs had serologic evidence of influenza infection after a mild influenza season
    • 59% could not recall being sick
    • 28% could not recall any respiratory infection

  – Suggests a high proportion of asymptomatic illness

1. *JAMA* 1999;281:908-13
Addressing concerns

- Concern: Not at risk (do not understand transmission of influenza)
  - Virus is spread from person to person, primarily by coughing and sneezing
  - Virus is shed 1-2 days before symptoms start and up to 4-5 days after onset of symptoms
  - Asymptomatic or mild cases are contagious
  - HCP often work while ill, thus exposing patients and colleagues
Addressing concerns

• Concern: Fear of needles
  – Intradermal vaccines, which use a much smaller needle, and nasal spray vaccines are available
  – Check with your health care provider and see if you can get one of these vaccines

• Concern: Not convenient (real or perceived)
  – Check with your Employee Health Nurse and/or Infection Control Coordinator to find out where and when you can receive a flu vaccine
Monitoring and Reporting Influenza Vaccine Coverage
Tools for monitoring influenza vaccine coverage

- RPMS Immunization Package
  - Influenza report
    - Can run weekly to monitor coverage, generate list of patients who are not vaccinated
- IHS Influenza Awareness System (IIAS)
  - Weekly influenza vaccine coverage data at facility and Area level
Monitoring and Reporting Influenza Vaccine Coverage

- National Immunization Reporting System (NIRS)
  - Enter RPMS report data for patients
    - As of Dec. 31st
    - As of Mar. 31st
  - Can view past reports
NIRS screen shot
Monitoring and Reporting Influenza Vaccine Coverage among HCP

• IHS and CMS requirement

• No report in RPMS to do this
  – Commercial employee health software products
  – Excel spreadsheet

• Enter HCP data into National Immunization Reporting System (NIRS)
  • As of Dec. 31st
  • As of Mar. 31st
# Healthcare Personnel (HCP) Influenza Reporting Form

Please complete and send this form to your Area Contact by **JANUARY 22nd, 2016** and **APRIL 22nd, 2016**

**Name of person reporting:**

**Facility Name:**

**Facility Type (IHS, Tribal or Urban):**

**Report Date:**

Please enter information regarding the influenza vaccination status of all your HCP.

<table>
<thead>
<tr>
<th>HCP Categories</th>
<th>Employee HCP</th>
<th>Non-Employee HCP</th>
<th>Other Contract Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employees (Staff on facility payroll)</td>
<td>Licensed independent practitioners: Physicians, advanced practice nurses &amp; physician assistants</td>
<td>Adult students/trainees &amp; volunteers</td>
</tr>
</tbody>
</table>

**Number of HCP who worked at this healthcare facility for at least 1 day between October 1 and March 31:**

**Number of HCP who received an influenza vaccine at this healthcare facility since influenza vaccine became available this season:**

**Number of HCP who provided a written report or documentation of influenza vaccination outside this healthcare facility since influenza vaccine became available this season:**

**Number of HCP who have a medical contraindication:**

**Number of HCP who declined to receive the influenza vaccine:**

**Number of HCP with unknown vaccination status (or criteria not met for questions 2-5 above):**

**Additional Questions:**

To help us with our on-going efforts to monitor and increase HCP influenza vaccination coverage, please answer the following questions.

1. **What method did you use to monitor HCP influenza vaccination coverage?**
   - [ ] Manuel
   - [ ] RPMS
   - [ ] Other Electronic Health Record/Database

Please place an X next to your answer.
# First Nations
## HCP Influenza Form
**August 1, 2014 - March 31, 2015 Flu Season**

### Facility Type
Urban

### State
NEW MEXICO

### Instructions:
Please enter information regarding the SEASONAL influenza vaccination status of all your HCP. Please include HCP who may have received vaccine at other locations in your counts.

<table>
<thead>
<tr>
<th>HCP Categories</th>
<th>Employee HCP</th>
<th>Non-Employee HCP</th>
<th>Total HCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of HCP who worked at this healthcare facility for at least 1 day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>between October 1 and March 31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* 1st Quarter: October 1 - December 31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* 2nd Quarter: October 1 - March 31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Number of HCP who received an influenza vaccine at this healthcare facility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>since influenza vaccine became available this season</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Number of HCP who provided a written report or documentation of influenza</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vaccination outside this healthcare facility since influenza vaccine became</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>available this season</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Number of HCP who have a medical contraindication to the influenza</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Resources

• Veteran’s Administration Influenza manual

• CDC material
  – Posters, print materials
    • http://www.cdc.gov/flu/freeresources/print-native.htm
  – PSAs
    • http://www.cdc.gov/flu/freeresources/media-psa.htm

• Good Health TV video PSAs
  – http://www.ndhealth.gov/Immunize/PSA/