Protecting the Community: An Update on Influenza Vaccination and Sexually Transmitted Infections

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I have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.
Pharmacist Objectives

1. Describe epidemiology and pathophysiology of influenza
2. List patient populations at high risk for developing flu-related complications
3. Summarize new influenza vaccination recommendations for 2014
4. Explain the current treatment recommendations for South Dakota’s most frequently encountered Sexually Transmitted Infections (STIs)
5. Analyze recent changes in the South Dakota Department of Health’s STIs surveillance
Technician Objectives

1. List common signs and symptoms of influenza
2. Recognize different names for influenza vaccinations
3. Identify who should get the influenza vaccine
4. Name the most frequently encountered sexually transmitted diseases in South Dakota
5. Describe Expedited Partner Therapy
The “Flu”

What is influenza?
• Contagious respiratory illness caused by influenza viruses that infect the nose, throat, and lungs

Transmission
• Primarily transmitted from person to person via droplets
  – May also occur through direct skin-to-skin contact or indirect contact with respiratory secretions
• Contagious: 2 days before to approximately 5 days after onset of symptoms
  – Children can spread the virus for 10 days or longer
Influenza Viruses

Orthomyxoviridae family = A, B and C

Ribonucleoprotein (RNP)

Hemagglutinin (HA)

Neuraminidase (NA)
Nomenclature

• Conventional nomenclature
  – Influenza virus type
  – Host species (omitted in the case of human origin)
  – Geographical site
  – Serial number
  – Year of isolation

• Influenza virus type A:
  – hemagglutinin (H) and neuraminidase (N) subtypes are added
  – 16 hemagglutinin subtypes (H1 through H16)
  – 9 NA subtypes (N1 through N9)
Nomenclature Examples

Parental avian strain associated with the circulating H5N1 of Asian lineage was isolated from a goose in the Chinese province, Guangdong:

First documented human case of Asian lineage H5N1 infection from Hong Kong:
Entry, Replication and Spread

Respiratory Epithelial Cell
Clinical Presentation

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
</tr>
<tr>
<td>Nasal secretions (runny or stuffy nose)</td>
</tr>
<tr>
<td>Fatigue</td>
</tr>
</tbody>
</table>

Highest rate of infection = children

Highest rate of severe illness, hospitalization and death = <2yo, >65yo or comorbid conditions
### “Flu” vs. “Common Cold”

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Influenza</th>
<th>Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>Usually high, lasts 3-4 days</td>
<td>Unusual</td>
</tr>
<tr>
<td>Headache</td>
<td>Yes</td>
<td>Unusual</td>
</tr>
<tr>
<td>Fatigue and/or weakness</td>
<td>Can last up to 2-3 weeks</td>
<td>Mild</td>
</tr>
<tr>
<td>Pains, aches</td>
<td>Usual and often severe</td>
<td>Slight</td>
</tr>
<tr>
<td>Exhaustion</td>
<td>Early and sometimes severe</td>
<td>Never</td>
</tr>
<tr>
<td>Stuffy nose</td>
<td>Sometimes</td>
<td>Common</td>
</tr>
<tr>
<td>Sore throat</td>
<td>Sometimes</td>
<td>Common</td>
</tr>
<tr>
<td>Cough</td>
<td>Yes</td>
<td>Unusual</td>
</tr>
<tr>
<td>Chest Discomfort</td>
<td>Common and sometimes severe</td>
<td>Mild</td>
</tr>
<tr>
<td>Complications</td>
<td>Bronchitis, pneumonia; in severe cases life-threatening</td>
<td>Sinus congestion</td>
</tr>
</tbody>
</table>
Vaccination

• Vaccines are apathogenic entities
• Cause the immune system to respond
• When the body encounters the specific pathogen represented by the vaccine, it is able to recognize it and mount a protective immune response
Live vs Inactivated Vaccines

Live = contain a laboratory weakened version of the virus

Inactivated = vaccine created by killing the disease-causing virus with chemicals, heat, or radiation
Immunity to Influenza

• Occurs as a result of the development of antibody directed at the surface antigens, particularly hemagglutinin (H)

• However, immunity to one influenza subtype does not offer protection against other subtypes or types of influenza
Drift vs Shift

• Antigenic variants are created by point mutations in the surface antigens of a particular subtype, resulting in small changes in the H and/or N molecules, which is called ANTIGENIC DRIFT.

• Drift is:
  – the basis for seasonal epidemics of influenza,
  – the reason for changes in the annual influenza vaccine
  – the rationale behind recommendations for annual vaccination
ANTIGENIC SHIFT occurs when the influenza virus acquires new H and/or N molecules via genetic reassortment rather than point mutations.

- The genetic change enables a flu strain to jump from one animal species to another, including humans.
- Most often this occurs when an animal that supports the growth of multiple subtypes of influenza, such as a pig, is infected with two subtypes of the virus at the same time. When the viruses infect the same cell, the genes from each subtype mix yielding a new strain.
Pharmacist Assessment Question

True or False:
Antigenic shift is the reason for changes in the annual influenza vaccine
A bird passes a bird strain of influenza A to an intermediate host such as a pig.

A person passes a human strain of influenza A on to the same pig.
Influenza Pandemic of 1918

- Misnomer – no evidence that strain originated in Spain
- Simultaneous spread in 3 distinct waves during a 12-month period in 1918-1919, across Europe, Asia, and North America
- It was the worst pandemic in history
  - More fatalities than World War I
  - Estimated > 50 million people died
- First wave (spring of 1918) was highly contagious but not particularly deadly
- Second wave (September) spread the deadly form
Asian Influenza of 1957

- Began when a new H2 subtype surfaced in China in 1957
- Outbreaks were frequently explosive, but the death toll was much lower
- Patients with chronic underlying disease and pregnant women were particularly at risk of developing pulmonary complications
Hong Kong Influenza of 1968

The H2N2 virus of the Asian flu circulated in the human population until 1968 when a new H3 subtype emerged in China and Hong Kong following genetic reassortment with the H2N2 virus.

The H3N2 virus quickly spread to the US and later to Europe. This pandemic caused more than 30,000 deaths in the US and approximately 2 million deaths worldwide.

The lower morbidity and mortality associated with the Hong Kong flu may be explained by previous exposure of the population to the N2 subtype.
Influenza Viruses of Public Health Concern

- **Human seasonal influenza viruses:**
  - A(H3N2) strains, drifts and shifts
  - A(H1N1) strains, drifts and shifts
  - B strains, drifts

- **Swine influenza virus:**
  - A(H3N2) variant, outbreaks in United States in 2012

- **Avian influenza viruses:**
  - A(H5N1) emerged in Hong Kong in 1997
  - A(H7N9) emerged in China in 2013
South Dakota Flu Statistics

![Bar chart showing flu statistics for South Dakota from 1999-00 to 2012-13. The chart indicates the percentage of cases for Influenza B, Influenza A(H3), and Influenza A(H1) for each year.]
Vaccination Facts

• Vaccination and the use of antiviral drugs are two of the most important response measures.

• Vaccine Information Statements (VISs) are information sheets produced by the CDC that explain both the benefits and risks of a vaccine to vaccine recipients.
Influenza Vaccine Composition for the 2014–15 Season

• U.S. licensed influenza vaccines will contain the same vaccine strains as 2013–14 vaccine

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

• Quadrivalent influenza vaccines will contain:
  – The above PLUS
  – B/Brisbane/60/2008-like (Victoria lineage) virus
Vaccination Names

Inactivated quadrivalent (IIV4)
- Fluarix
- FluLaval
- Fluzone

Inactivated trivalent (IIV3)
- Afluria
- Fluarix
- FluLaval
- Fluvirin
- Fluzone
- Fluzone HD**
- Flublok (RIV3)**

Live attenuated quadrivalent (LAIV4)
- FluMist

MMWR 63: p691-697
Who Should Get Vaccinated?

1. All persons aged > 6 months should be vaccinated annually

2. Populations at **High** risk for developing flu-related complications
   - Children < 5 yo, but especially younger than 2 yo
   - Adults ≥ 65yo
   - Pregnant women
   - American Indians and Alaskan Natives

www.CDC.gov
3. Persons at risk for medical complications due to influenza

- Adults and children who have chronic pulmonary, cardiovascular, renal, hepatic, neurological, hematologic, or metabolic disorders
- Persons who have immunosuppression
- Women who are or will be pregnant during the flu season
- Children and adolescents who are receiving long-term aspirin therapy and may be at risk from Reye’s syndrome after influenza virus infection
- Residents of nursing homes and other long-term care facilities
- American Indians/Alaska Natives
- Persons who are morbidly obese (BMI > 40)
4. Persons who live with or care for persons a higher risk for influenza-related complications

- Healthcare personnel
- Household contacts and caregivers of children ≤ 59 months and adults ≥ 50 years (emphasis on vaccinating contacts of children < 6 months)
- Household contacts (including children) and caregivers of persons with medical conditions
True or False:
A 40yo female healthcare worker should receive the flu vaccine
Pharmacist Assessment Question

Which patient is at high risk of developing flu-related complications?

1. A 46 yo African American male
2. A 27 yo pregnant woman
3. A 39 yo female with a history of trigeminal neuralgia
July 2014 Update

• Live attenuated influenza vaccination (LAIV) should be used for healthy children aged 2 to 8 years who have no contraindications or precautions
  – If LAIV is not immediately available, inactivated influenza vaccine should be used. Vaccination **should not** be delayed in order to procure LAIV

• LAIV is **NOT** indicated for patients aged younger than 2 years or older than 49 years
Children 6mo thru 8yo need **ONLY ONE** dose of vaccine for 2014-15 if:

1) at least 1 dose of 2013–14 seasonal influenza vaccine

1) 2 or more doses of seasonal influenza vaccine since July 1, 2010

1) 2 or more doses of seasonal influenza vaccine before July 1, 2010, **AND** 1 or more doses of monovalent 2009(H1N1) vaccine

1) 1 or more doses of seasonal influenza vaccine before July 1, 2010, **AND** 1 or more doses of seasonal influenza vaccine since July 1, 2010
Egg Allergies

• Most, but not all, types of flu vaccine contain a small amount of egg

• People who have ever had a severe allergic reaction to eggs can get recombinant flu vaccine
  – Or they should get the regular flu shot given by a medical doctor with experience in management of severe allergic conditions

• People who have had a mild reaction to egg—that is, one which only involved hives—may get a flu shot with additional safety measures.
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<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>Percentage</th>
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<tbody>
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<tr>
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<td>Florida</td>
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<tr>
<td>49</td>
<td>Alaska</td>
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<tr>
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<tr>
<td>51</td>
<td>Nevada</td>
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CDC-NIS 2011-2012
QUESTIONS ABOUT THE FLU??
SEXUALLY TRANSMITTED INFECTIONS
## SOUTH DAKOTA

1 January – 30 June 2014

Provisional Data

<table>
<thead>
<tr>
<th>Disease/Agent</th>
<th>Cases year-to-date</th>
<th>Rate (cases per 100K population)</th>
<th>5-yr median cases (2009-2013)</th>
<th>Percent change</th>
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<tbody>
<tr>
<td>Chlamydia</td>
<td>2008</td>
<td>243.7</td>
<td>1675</td>
<td>+20%</td>
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<tr>
<td>Gonorrhea</td>
<td>400</td>
<td>48.5</td>
<td>297</td>
<td>+35%</td>
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<tr>
<td>Syphilis, early</td>
<td>56</td>
<td>6.8</td>
<td>1</td>
<td>&gt;1000%</td>
</tr>
</tbody>
</table>
Chlamydia

• Chlamydia is the most commonly reported STI in the United States and South Dakota
  – In 2012, 1.4 million cases reported nationwide
    • Estimated that 2.86 million cases occurred

• Caused by *Chlamydia trachomatis*

• Transmitted via all versions of sexual contact as well as perinatally during childbirth
Chlamydia

• Most people who have chlamydia do not know, since the disease is often asymptomatic

“Sexually active women 25 years and younger should receive an annual chlamydia test

www.cdc.gov/std/chlamydia”
Chlamydia in SD

<table>
<thead>
<tr>
<th>Regions</th>
<th>Cases</th>
<th>Rate</th>
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<td>Rapid City MSA</td>
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<td>Southeast</td>
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<td>West</td>
<td>420</td>
<td>457</td>
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<tr>
<td>South Dakota</td>
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Chlamydia, 2009-2013

Age of cases

- 0: 1368
- 0-1yr: 636
- 2-5yr: 62
- 6yr+: 0

SD DOH
Current Treatment Recommendations for CHLAMYDIA

Azithromycin 1g PO once

OR

Doxycycline 100 mg PO BID 7 days*

NOTE: Patients should abstain from sexual activity for 7 days after single dose antibiotics or until completion of a 7-day course of antibiotics, to prevent spreading the infection to partners.
Gonorrhea

PUBLIC HEALTH THREAT:
• 2nd most commonly reported notifiable infection in the US
• 2nd most common STI in South Dakota

LEVEL OF CONCERN – URGENT
• Resistance to antibiotics usually used to treat it
• If cephalosporin-resistant *N. gonorrhoeae* becomes widespread, the public health impact during a 10-year period is estimated to be:
  – 75,000 additional cases of pelvic inflammatory disease
  – 15,000 cases of epididymitis
  – 222 additional HIV infections

*MMWR 62:103–106.*
Gonorrhea in SD

<table>
<thead>
<tr>
<th>Regions</th>
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<th>Rate</th>
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<tr>
<td>South Dakota</td>
<td>400</td>
<td>48</td>
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</table>
Drug-resistant Gonorrhea

CDC recommends combination therapy:

1. Ceftriaxone 250 mg IM once
2. Azithromycin 1 g PO once (preferred) or
   Doxycycline 100 mg PO BID x7d (alternate)

NOTE: Patients infected with *N. gonorrhoeae* frequently are coinfectedit with *C. trachomatis*; this finding has led to the recommendation that patients treated for gonococcal infection also be treated routinely with a regimen that is effective against uncomplicated genital *C. trachomatis* infection

Possible New Gonorrhea Tx Regimens

• CDC and National Institutes of Health (NIH) trial
• N = 401 (male and females 15-60yo) randomized
  – Injectable Gentamicin PLUS PO Azithromycin (N = 202)
    • 100% effective for curing genital gonorrhea infections
  – PO Gemifloxacin PLUS PO Azithromycin (N = 199)
    • 99.5% effective
  – The effectiveness of both combinations was 100% for infections of the throat and rectum
  – Side effects reported were primarily nausea, diarrhea, and abdominal pain/discomfort
Terminology

• **Partner services** – clinical or public health efforts to ensure the treatment of the potentially exposed sex partner of persons with STI

• **Expedited Partner Therapy (EPT)** – treating sex partners without requiring their mandatory clinical evaluation first

• **Patient delivered partner therapy (PDPT)** – giving patients medication or a prescription to give to their partner
Randomized Controlled Trials in 1990s and 2000s

<table>
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<th>Study name</th>
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The Evolving Role of Public Health Outreach to Control HIV/STDs, Dr. Matthew Golden
Washington State Community-level Randomized Trial of EPT

• Objectives
  – To determine if a program to promote the use of EPT can be brought to scale in a state
  – To determine if an EPT program can decrease the prevalence of chlamydia and gonorrhea in women
Two Part Intervention:

1. Promotion of PDPT and Access to free PDPT

Free PDPT packs available to all providers
- Stocked in high-volume clinics and in 157 pharmacies statewide
- Preprinted prescriptions

Medication prepackaged to meet requirements of state pharmacy board
- Allergy warning (English and Spanish)
- Azithromycin 1g
- Cefixime 400mg (gonorrhea only)
- Condoms
- Information
Two Part Intervention:

1. Targeted Provision of Public Health Partner Services

   Partner services triaged to persons at high risk for not ensuring their partners treatment
   - Triage done by medical providers
   - Recommended for persons with >1 sex partner or partner they did not anticipate having sex with again
What does the study tell us?

- Promotion of widespread use of free PDPT is scalable and sustainable
- Targeted chlamydial partner services is probably not scalable and sustainable

- Problems: Who will pay for the medication?
  - Two possible solutions
    - Buy the meds together – 340B pricing
    - Convince/require insurer to pay
Based on S.D. Administrative Rule 44:20:03:01. General measures for control of communicable conditions.

http://legis.state.sd.us/rules/
STD Program Can Help

Need more info? Need Partner Packs?

Amanda Gill
amanda.gill@state.sd.us
605-773-4794
STD Program Manager
South Dakota Department of Health
Syphilis

• The South Dakota Department of Health is currently experiencing it’s biggest syphilis outbreak since 1970

• The State has Prioritized syphilis
Syphilis

• Caused by the *Treponema pallidum*
• Syphilis is curable in early stages
• But if left untreated, syphilis progresses in stages:
  – Primary: One or more chancre[s appear 10 to 90 days after infection
  – Secondary: Rashes (palms of the hands the soles of the feet, or on the face usually)
  – Early latent: seroreactive, but has no symptoms.
  – Later stages can cause brain damage, heart disease, blindness and death.
Syphilis in SD

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Early and Congenital Cases 2009-2013

Ages of Cases
Current Treatment Recommendations

• **Primary, Secondary, Early Latent**
  – Benzathine penicillin G 2.4 million units IM in a single dose

• **Late Latent/Latent of Unknown Duration**
  – Benzathine penicillin G 7.2 million units total, administered as 3 doses of 2.4 million units IM each at 1-week intervals

NOTE: Penicillin allergy in pregnancy – desensitize and treat with penicillin

MMWR 61:590–594
Call to Action from the State

1. When you see a clear sign of syphilis—treat first, test second
2. Add a syphilis screening test (RPR) to any panel of STD or HIV testing that you are ordering
3. All pregnant women should be screened for syphilis at least 3 times during the course of pregnancy
4. If a patient presents as a ‘contact’ (or sexual partner) of a primary, secondary, or early latent syphilis case, CDC recommends that penicillin treatment should be administered presumptively
SD Facts

• You can get regular SD Infectious Disease Updates here: http://doh.sd.gov/statistics/surveillance/

• West – 1-866-474-8221
• Central – 1-866-229-4927
• Northeast – 1-866-805-1007
• Southeast – 1-866-315-9214
• State – 1-800-592-1861
References


• [Memo] South Dakota Department of Health to Healthcare Providers. May 1, 2014

References


• [website] Influenza Report. www.influenzareport.com
Questions??
Pharmacist Assessment Questions

1. **True or False**: Antigenic shift is the reason for changes in the annual influenza vaccine

2. Which patient is at high risk of developing flu-related complications?
   - A 46 yo African American male
   - A 27 yo pregnant woman
   - A 39 yo female with a history of trigeminal neuralgia

3. **True or False**: Live attenuated influenza vaccine (LAIV) is not indicated for patients aged younger than 2 years or older than 49 years

4. Which of the following is **NOT** a current recommendation for the treatment of gonorrhea?
   - Ceftriaxone 250 mg IM PLUS Azithromycin 1 gm PO
   - Doxycycline 100 mg PO BID 7 days
   - Metronidazole 500mg PO BID for 7 days

5. **True or False**: The South Dakota Department of Health is currently experiencing its biggest syphilis outbreak since 1970.
Pharmacy Technician Assessment Questions

1. Which of the following symptoms is associated with influenza?
   - Heartburn
   - Headache
   - Ear ache
   - Hair loss

2. Which of the following is **NOT** a trade name for flu vaccine in 2014:
   - Fluzone
   - Fluvirin
   - Flugone
   - FluMist

3. **True or False**: A 40yo female healthcare worker should receive the flu vaccine

4. **True or False**: Gonorrhea is the most commonly reported sexually transmitted infection in the US and South Dakota.

5. **True or False**: The definition of Expedited Partner Therapy is treating sex partners without requiring clinical evaluation first