

Influenza: Disease and Vaccine in 2013

Learning objectives: Following this session, you will be able to:

1. Discuss the epidemiology of influenza in New Jersey in 2013
2. Diagnose influenza and prescribe antiviral agents for children
3. Counsel regarding influenza vaccination

NOTES

I. Influenza virus

A. Orthomyxovirus, 3 antigenic types (A,B,C)

1. Yearly outbreaks of types A and B
2. Surface antigens on A: hemagglutinin (H), neuraminidase (N)

B. Antigenic shift – major change in surface

1. Responsible for pandemics (1918, 1957-H2, 1968-H3, 1977-H1)
2. To date has occurred only in influenza A strains

C. Antigenic drift – minor changes

1. Responsible for yearly outbreaks

D. Animal strains: birds, pigs

1. Can combine with human strains and exchange genetic material

II. Influenza, the illness

A. Symptoms: fever, chills, aches, malaise, myalgia

B. Signs: fever, pharyngitis, rhinitis, cough

C. Epidemiology

1. Yearly outbreaks, winter
2. Multiple outbreaks on cruise ships - summer
3. Children
 - a. Highest attack rates: 15 to 45% per year
 - c. Highest hospitalization rates
 - d. Major transmitters: high titer, longer shedding, poor hygiene, share nasal secretions
4. Person to person spread: droplets, hands, fomites
5. Contagious 24 hours before symptoms to 1 week after
6. Incubation 1 to 3 days

D. The 2012-2013 influenza season: <http://www.cdc.gov/flu/weekly/>

1. Nation wide peak disease last week in December and first week in January
 - a. Incidence dropped during January

- b. Strains circulating: about 80% type A (H3) with most of the rest type B; <5% is H1N1
 - c. No oseltamivir resistance among H3 and B strains; only 1/118 strains of H1N1 resistant; all strains sensitive to zanamivir.
 - d. Good match with the vaccine
 - e. As of January 31, 2013 there were 37 pediatric deaths reported
2. Estimated vaccine efficacy 60%
 3. New Jersey: <http://www.cdc.gov/flu/weekly/WeeklyFluActivityMap.htm>
 - a. Influenza-like illness widespread December 15 through January 19

E. Complications

1. Bacterial superinfection
 - a. *Streptococcus pneumoniae*, *Staphylococcus aureus*
 - b. Pneumonia
 - c. Otitis media/sinusitis
2. Reye syndrome
3. Triggers asthma
4. Myositis
5. Encephalitis

III. Diagnosis of influenza

- A. Clinical is generally sufficient, especially during an outbreak
 1. Confirmatory testing is not required for antiviral use
- B. Culture
 1. Throat gargle or nasopharyngeal wash
 2. Highest yield early in illness
- C. Antigen detection
 1. Rapid
 2. Sensitivity varies year to year, 40 to 70%
 3. Specificity is 90 to 95%
- D. Serology requires acute and convalescent sera

IV. Management of influenza

- A. Symptomatic
 1. Antipyretics may prolong viral shedding
 - a. Aspirin contraindicated because of risk of Reye syndrome

2. Other: complementary medicines
 - a. First do no harm, most don't harm

B. Antivirals

1. Shorten the course and decrease transmission
2. Start as soon as possible for maximal benefit
 - a. Shortens illness by 1 to 3.5 days depending on the study
3. Amantadine (Symmetrel, generic)/ Rimantadine (Flumadine)
 - a. No longer used as current strains are resistant
4. Oseltamivir (Tamiflu)
 - a. Mode of action: neuraminidase inhibitor, prevents entry of virus
 - b. Approved for people age 1 yr and over for prophylaxis, 2 wk and older for therapy
 - c. Dose varies by age and weight:
 - (1) Age 2 weeks to younger than one year is 3mg/kg twice a day
 - (2) Age 1 year and older who weigh 15 kg or less, 30 mg twice a day.
 - (3) Weight 15 to 23 kg, 45 mg twice a day
 - (4) Weight 23 to 40 kg, 60 mg twice a day
 - (5) Weight more than 40 kg, 75 mg twice a day
 - d. Duration: 5 days for treatment; 7 to 10 days for prophylaxis
 - e. Side effect: nausea, decreased by giving with food
5. Zanamivir (Relenza)
 - a. Mode of action: neuraminidase inhibitor, prevents entry of virus
 - b. Approved for children age 5 yr and over for prophylaxis, 7 yr and older for therapy
 - c. Dose: 20 mg/day by inhalation, bid (10 mg per puff);
 - d. Duration: 5 days for treatment; 7 to 10 days for prophylaxis
 - e. Precaution in patients with bronchospasm

V. Prevention of influenza

A. Infection control

1. Hand washing
2. Isolation
3. Limit visitors during influenza outbreaks
4. Respiratory hygiene: NB: do NOT have children cover mouth with hands!
 - a. Cough, sneeze into a sleeve – use the elbow method

B. Inactivated vaccine

1. Composition altered yearly
 - a. Inactivated viruses, 3 strains
 - b. Split product - subvirion or purified surface antigen
 - c. Supplied as single doses without thimerosal
2. Indications
 - a. All people 6 months of age or older
 - b. High risk children: asthma and chronic pulmonary, cardiac disease, immunosuppressed, HIV, hemoglobinopathy, other chronic illnesses, neuromuscular problems, aspirin therapy, pregnancy
 - c. Health care providers: mandates recommended
 - d. Vaccinating pregnant women protects them and their infants
3. Contraindications/precaution
 - a. Anaphylaxis to chicken or egg products
 - b. Vaccines can be given to those with lesser reactions to eggs
 - c. Cell culture systems for growth of the vaccine viruses will remove this concern
4. Schedule
 - a. Yearly as soon as it is available
 - b. Age 6 mo – 3 yr: 0.25 ml dose(s), one month apart for initial year
 - c. Age 3 to 9 years: 0.5 ml dose(s), one month apart for initial year
 - d. Age over 9 yr: one dose
5. Websites for specific recommendations: www.cdc.gov/flu and www.aap.org
6. Quadrivalent vaccines in development: 2 A and 2 B strains
7. New techniques for production: cell culture, recombinant DNA techniques

C. Live attenuated, cold adapted virus (FluMist)

1. Can't survive at body temperature
2. Immunogenic
3. Safe, few adverse effects
4. Very limited transmission even in day care setting
5. Approved this year for use in healthy people between 2 and 50 years of age
 - a. Not approved for use in at risk people
 - b. Approved for use in health care providers except those caring for patients with severe T cell dysfunction (for example, bone marrow transplant recipients)

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D. Vaccine efficacy

1. Depends on match between vaccine and circulating viruses
2. Age related, lower in younger children and the elderly; generally 40 to 60% efficacy

E. Chemoprophylaxis

1. Oseltamivir for age 1 year and older
2. Zanamivir for age 5 and older
3. Indications
 - a. Unable to vaccinate or unlikely to respond
 - b. While awaiting vaccine induced immunity
 - c. During epidemics where vaccine poor match – high risk
 - d. Outbreaks in long term care facilities
 - e. Consider for household or other close contacts
4. Dosing: see antivirals – IV B.

References

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Websites

<http://www.cdc.gov/flu/index.htm>

<http://www.cdc.gov/flu/weekly/WeeklyFluActivityMap.htm>

<http://www2.aap.org/immunization/>

<http://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Children-and-Disasters/Pages/Influenza-Pandemics.aspx>

Information for parents

<http://www.healthychildren.org/English/safety-prevention/immunizations/Pages/The-Flu-Seasonal-Influenza-2012-2013.aspx>