

Influenza Primer

Archive Document - see website for current influenza information

<http://www.samaritanid.com/influenzaPrimer.html>

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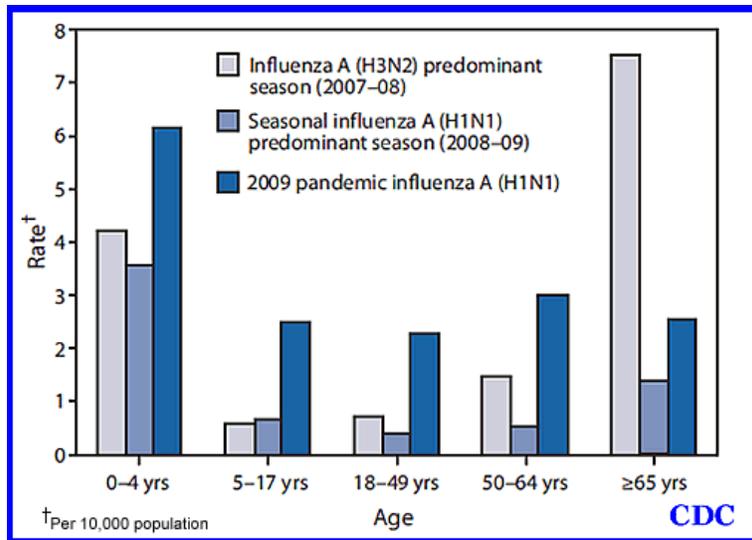
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Epidemiology of Influenza

In the United States, annual epidemics of influenza occur typically during the late fall through early spring. Influenza viruses can cause disease among persons in any age group, but rates of infection are highest among children. During these annual epidemics, rates of serious illness and death are highest among persons aged ≥ 65 years, children aged < 2 years, and persons of any age who have medical conditions that place them at increased risk for complications from influenza. Influenza epidemics were associated with estimated annual averages of approximately 36,000 deaths during 1990--1999 and approximately 226,000 hospitalizations during 1979--2001.

In April 2009, a novel influenza A (H1N1) virus, 2009 influenza A (H1N1), that is similar to but genetically and antigenically distinct from influenza A (H1N1) viruses previously identified in swine, was determined to be the cause of respiratory illnesses that spread across North America and was identified in many areas of the world by May 2009. Influenza morbidity caused by 2009 pandemic influenza A (H1N1) remained above seasonal baselines throughout spring and summer 2009 and was the cause of the first pandemic since 1968. In the United States, the pandemic was characterized by a substantial increase in influenza activity that was well beyond historical norms in September 2009, peaking in late October 2009, and returning to seasonal baseline by January 2010

In typical flu seasons approximately 60% of hospitalizations and 90% of influenza related deaths occur in persons greater than 65 years of age. Illness due to 2009 H1N1 Influenza A differed notably from that of typical seasonal influenza A in that severe illness occurred more commonly in younger age groups. The graphic below illustrates the differing epidemiology of illness due to recent influenza A strains:



Cumulative rate of hospitalizations during three influenza seasons, by age group ---
Emerging Infections Program, United States, 2007--2010

Influenza caused by 2009 pandemic influenza A (H1N1) virus is expected to continue to occur during future winter influenza seasons in the Northern and Southern Hemispheres, but whether 2009 pandemic influenza A (H1N1) viruses will replace or co-circulate with one or more of the two seasonal influenza A virus subtypes (seasonal H1N1 and H3N2) that have co-circulated since 1977 is unknown.

Clinical Illness Due to Influenza

- The typical incubation period for influenza is 1—4 days (average: 2 days). Infected persons may be infectious to others even before they are clinically ill.
- Typical influenza signs and symptoms – fever, cough, sore throat, myalgias, headache, prostration
- CDC case definition - Fever (temperature of 100°F [37.8°C] or greater) and a cough and/or a sore throat in the absence of a known cause other than influenza.
- Fever is not always present; multiple other **signs and symptoms (Appendix 1)** may be.
- Complications have included post-influenza bacterial pneumonias - *Streptococcus pneumoniae*, *Staphylococcus aureus* (including MRSA).
- Severe illness and death tends to occur among those with traditional **risk factors (Appendix 2)**
- According to the American Academy of Pediatrics certain **children (Appendix 3)** were at particular risk of complications in the 2009-2010 pandemic flu season.
- *Severe* influenza viral pneumonia in young healthy individuals occurred in the 2009-2010 pandemic flu season.

Diagnosis of Influenza

- Point of care nasopharyngeal swab rapid tests have only a 10-70% sensitivity for detecting infection with influenza.
 - Rapid tests can distinguish influenza A from influenza B.
 - **A negative rapid test *does not* rule out influenza.**
- Influenza PCR available at reference laboratories
 - Definitive but not timely
 - Expensive; usually performed only on those sick enough to require hospitalization
- *Outpatient diagnosis will depend upon clinical likelihood and current epidemiology.*

Who Should be Treated for Influenza?

- Treatment is recommended for all hospitalized patients with confirmed, probable or suspected influenza.
- Early empiric treatment should be considered for outpatients ill with influenza like illness who are at **higher risk (Appendix 2)** for influenza-related complications if treatment can be initiated within first 48 hrs.
- Signs and symptoms of severe illness due to suspected influenza (respiratory distress, confusion, severe dehydration) are an indication for immediate treatment, *regardless* of previous health or age. Infants and young children may manifest severe disease in a **variety of ways (Appendix 4)**.
- Because of limitations of diagnostic tests treatment decisions usually will have to be made empirically.

For the 2012-2013 flu season treatment/prophylaxis with oseltamivir (or zanamavir) is recommended.

When should prophylaxis be considered for persons exposed to persons ill with confirmed or likely influenza?

- Consider for:
 - Persons who are at **higher risk (Appendix 1)** for complications of influenza and are a close contact of a person with confirmed, probable, or suspected influenza during that person's **infectious period (Appendix 5)**.
 - Health care personnel, public health workers, or first responders who have had a recognized, unprotected close contact exposure to a person with confirmed, probable, or suspected influenza during that person's infectious period if they are at higher risk of complications of influenza.

- Antiviral agents should not be used for post exposure chemoprophylaxis in healthy children or adults based on potential exposures in the community, school, camp or other settings. Chemoprophylaxis generally is not recommended if more than 48 hours have elapsed since the last contact with an infectious person.
- Early treatment is an **emphasized** alternative to chemoprophylaxis after a suspected exposure. Household or close contacts (with risk factors for influenza complications) of confirmed or suspected cases can be counseled about the early signs and symptoms of influenza, and advised to immediately contact their health care provider for evaluation and possible early treatment if clinical signs or symptoms of influenza develop.

How might treatment/prophylaxis recommendations be different depending upon the strain of circulating influenza?

- Cases of influenza may be secondary to H1N1, H3N2, or influenza B viruses. These various strains of influenza may vary in antiviral susceptibility such that effective therapy may require different choices of antiviral agents.
- Knowledge of what strains of influenza are circulating will depend upon information provided by public health authorities.

Vaccination for Influenza

Vaccination is the preferred method of preventing all strains of influenza.

- Trivalent vaccine - effective against anticipated H1N1 and H3N2 influenza A strains as well as influenza B
- Indicated for all persons aged 6 months of age or greater
- Children aged 6 months to 8 years may need two doses of vaccine.
- Available as either Trivalent Inactivated Influenza Vaccine (TIV) or Live Attenuated Influenza Vaccine (LAIV). LAIV is indicated for healthy, non-pregnant persons aged 6 months - 49 years (see contraindications below).
- A new "high dose" vaccine is available for immunization of persons aged 65 years or greater. In addition TIV is now also available in a form for intradermal administration.
- Safe and effective in preventing influenza illness/complications
- In addition to preventing clinical illness in individuals can also provide these benefits:
 - Decreased transmission of infection
 - Decreased employee illness and absenteeism
 - Decreased demands on limited quantities of antiviral medications

Vaccine Adverse Reactions/Contraindications

- Injectable inactivated influenza vaccine
 - Adverse Reactions
 - Local reactions - 15%-20%
 - Fever, malaise - not common
 - Allergic reactions - rare
 - Neurological - very rare reactions
 - Contraindication - severe egg allergy; previous Guillain Barre Syndrome within 6 weeks of previous influenza vaccine and moderate or severe acute illness are relative contraindications.
- Live Attenuated Influenza Vaccine (LAIV) - **Contraindications**
 - Children younger than 2 years of age
 - Persons 50 years of age or older
 - Persons with **chronic medical (Appendix 2)** conditions
 - Children and adolescents receiving long-term aspirin therapy
 - Immunosuppression from any cause
 - Pregnant women
 - Severe (anaphylactic) allergy to egg or other vaccine components
 - History of Guillain-Barré syndrome within 6 weeks of previous influenza vaccine is a relative contraindication.
 - Children younger than 5 years with recurrent wheezing
 - Moderate or severe acute illness is a relative contraindication.
- Live Attenuated Influenza Vaccine - **Adverse Reactions**
 - Children
 - no significant increase in URI symptoms, fever, or other systemic symptoms
 - significantly increased risk of asthma or reactive airways disease in children 12-59 months of age
 - Adults
 - significantly increased rate of cough, runny nose, nasal congestion, sore throat, and chills reported among vaccine recipients
 - no increase in the occurrence of fever
 - No *serious* adverse reactions identified

Healthcare Workers and Live Attenuated Influenza Vaccine (LAIV)

- Unless healthcare workers are caring for patients on hematopoietic stem cell transplant units where patients are in specialized "reverse" isolation they *can* receive LAIV without the need for special precautions.
- LAIV transmission from a recently vaccinated person causing clinically important illness in an immunocompromised contact has not been reported.

Simultaneous Administration of LAIV and Other Vaccines

- Inactivated vaccines can be administered either simultaneously or at any time before or after LAIV.
- Seasonal and novel H1N1 LAIV *should not* be administered on the same day.
- Other live vaccines can be administered on the same day as LAIV.
- Live vaccines not administered on the same day should be administered at least 4 weeks apart.

Infection Prevention - General

- Hand hygiene and respiratory etiquette
 - Signage with instructions prominently displayed
 - Hygiene/respiratory etiquette “stations”
- Segregation of patients with influenza like illness (ILI) in waiting rooms, ERs, urgent cares
- Surgical masks for patients suffering with ILI and healthcare workers evaluating them

Influenza Infection Prevention - Hospital

- All hospitalized patients with influenza like illness should be placed in droplet isolation. Any healthcare workers (HCWs) entering the room should follow standard precautions, wear a surgical mask, and use eye protection if anticipating contact within 6 feet of the patient.
- HCWs should use N95 respirators if involved in procedures likely to cause aerosolization – intubation, bronchoscopy, open airway suctioning, autopsy

Hospital Isolation for Influenza

- Isolation for confirmed or suspected influenza should be maintained for seven days from symptom onset or until symptoms abate whichever is longer.
- Isolation can be discontinued if a rapid test for influenza is negative and influenza is judged unlikely by the responsible physician.
- It is ***not necessary*** to have a definitively negative laboratory test result for influenza prior to discontinuing isolation if a physician judges infection unlikely.

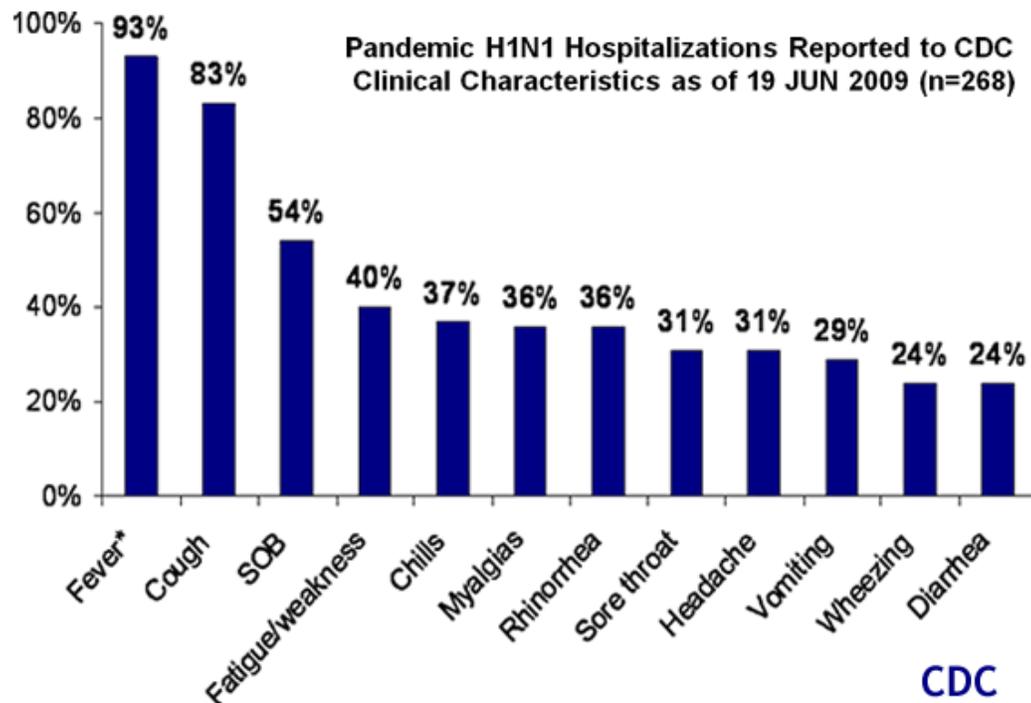
Healthcare Worker Illness

- Healthcare workers with suspected or confirmed influenza should be excluded from work for at least 24 hours after they no longer have a fever without the use of fever-reducing medicines – avoid “presenteeism.”
- Healthcare workers returning to work after influenza like illness who work in areas where severely immunocompromised patients are provided care (i.e., on haematopoietic transplant units using “reverse” isolation) should be considered for

temporary reassignment or exclusion from work for 7 days from symptom onset or until the resolution of symptoms, whichever is longer.

Appendix 1: Illness Due to Influenza

Illness due to influenza can have multiple signs and symptoms. Illness in the 2009-2010 flu season due to the 2009 H1N1 influenza A virus, likely the most extensively studied influenza strain ever, had the characteristics described in the graphic below:



Appendix 2: Risk Groups for Influenza Complications

- Children younger than 2 years old
- Adults 65 years of age or older
- Pregnant women or post-partum (within two weeks after delivery)
- Persons younger than 19 years of age who are receiving long-term aspirin therapy, because of an increased risk for Reye syndrome.
- Persons with the following conditions:
 - Chronic pulmonary (including asthma), cardiovascular (except hypertension), renal, hepatic, hematological (including sickle cell disease), or metabolic disorders (including diabetes mellitus)
 - Disorders that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk for aspiration (e.g., cognitive dysfunction, spinal cord injuries, seizure disorders, or other neuromuscular disorders)
 - Immunosuppression, including that caused by medications or by HIV
 - Morbid obesity (body-mass index ≥ 40)
- American Indians and Alaskan Natives

Appendix 3: Risk Groups for Influenza Complications, Children - 2009 Influenza H1N1

- Neurological disorders, such as:
 - Epilepsy or cerebral palsy, especially when accompanied by neurodevelopmental disabilities (e.g., moderate to profound intellectual disability [mental retardation] or developmental delay).
 - Neuromuscular disorders (e.g., muscular dystrophy), when associated with impairment in respiratory functioning.
- Chronic respiratory diseases associated with impaired pulmonary function and/or difficulty handling lung secretions: moderate and especially severe persistent asthma: technology-dependent children (e.g. those requiring oxygen, tracheostomy, or a ventilator).
- Moderate to profound intellectual disability (mental retardation) or developmental delay, especially when associated with specific conditions.
- Deficiencies in immune function or conditions that require medications or treatments (e.g., certain cancer treatments) that result in significant immune deficiencies.
- Congenital heart disease or significant metabolic (e.g., mitochondrial) or endocrine disorders, especially if a child has specific respiratory conditions.

Appendix 4: Severe Influenza Illness - Infants and Young Children

In young children, warning signs indicating the need for urgent medical attention include:

- Fast breathing or trouble breathing
- Bluish or gray skin color
- Not drinking enough fluids
- Severe or persistent vomiting
- Not waking up or not interacting
- Being so irritable that the child does not want to be held
- Flu-like symptoms improve but then return with fever and worse cough

Appendix 5: Influenza Transmission

In general, the incubation period for influenza is estimated to range from 1 to 4 days with an average of 2 days. Influenza virus shedding (the time during which a person might be infectious to another person) begins the day before illness onset and can persist for 5 to 7 days, although some persons may shed virus for longer periods, particularly young children and severely immunocompromised persons. The amount of virus shed is greatest in the first 2-3 days of illness and appears to correlate with fever, with higher amounts of virus shed when temperatures are highest.