What To Do About The Flu

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Disclosures

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Learning Objectives

By the end of this session, you should be able to:

1. Describe strategies for prevention of influenza
2. Explain challenges predicting the course of influenza outbreaks for 2017-2018 season
3. Identify vaccine recommendations for influenza for 2017-2018

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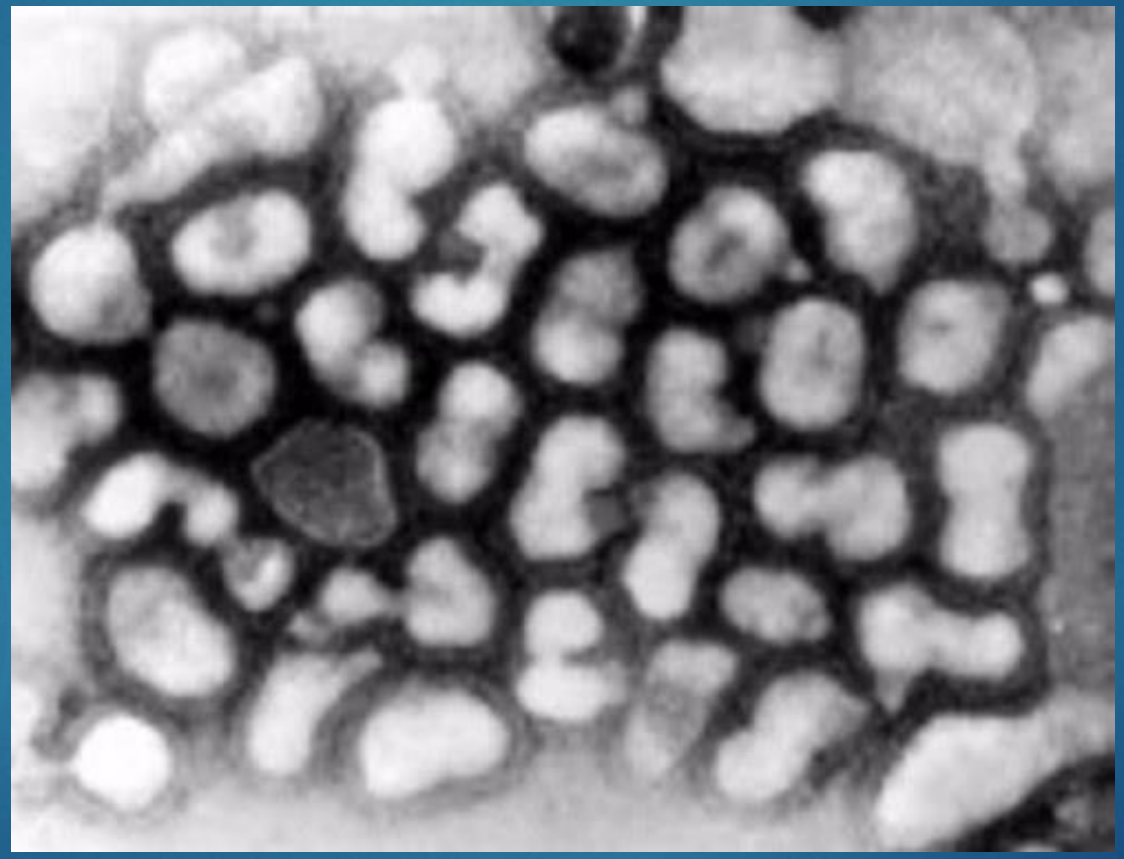
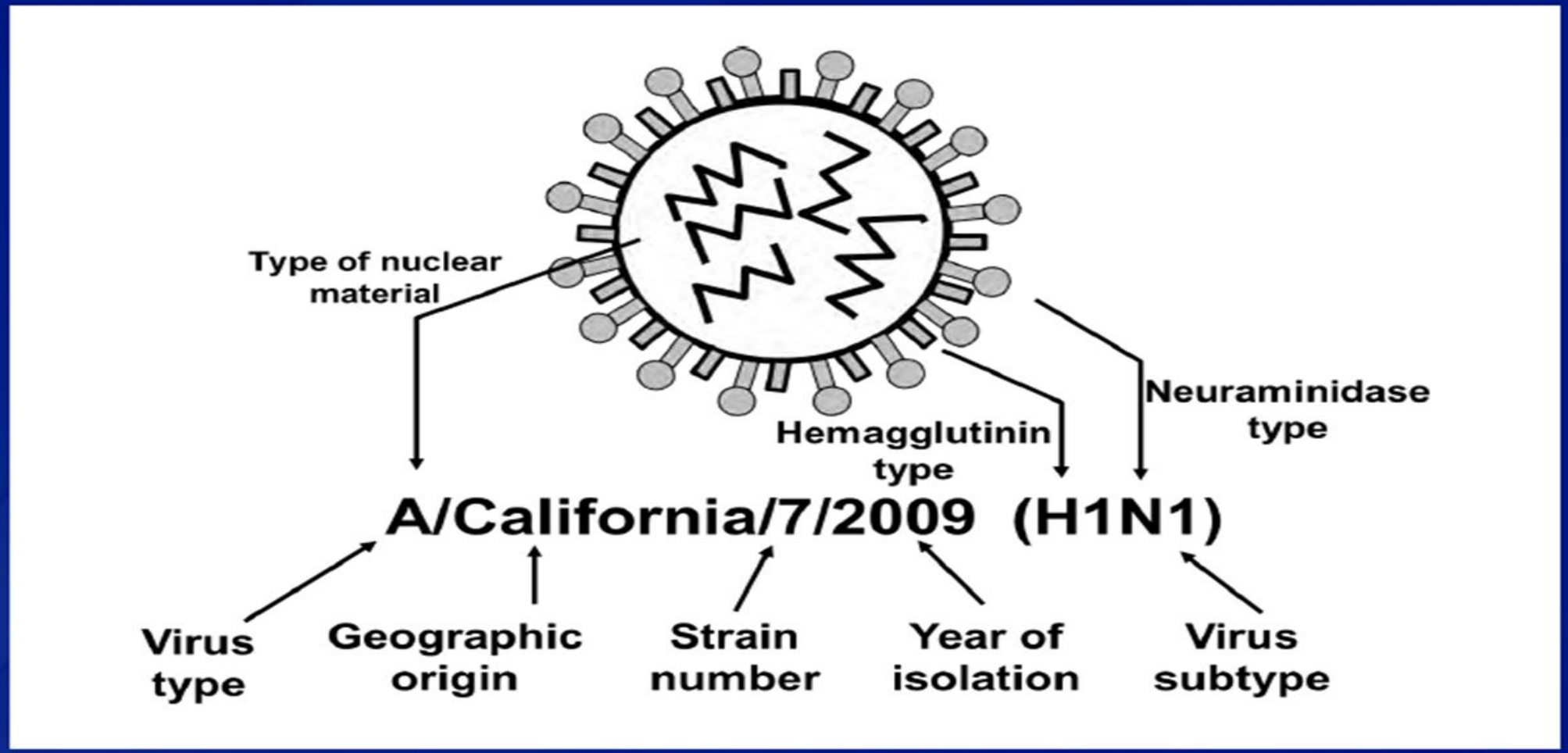
Influenza



Influenza Virus Strains

- Type A
  - Moderate to severe illness
  - All age groups
  - Humans and other animals
- Type B
  - Milder disease
  - Primarily affects children
  - Humans only
- Type C
  - Rarely reported in humans
  - No epidemics

Influenza Virus



Influenza Antigenic Changes

- Hemagglutinin and neuraminidase antigen changes with time
- Changes occur as a result of point mutations in the virus genome, or due to exchange of a gene segment with another subtype of influenza virus
- Impact of antigenic changes depend on extent of change (more change usually means larger impact)

Influenza Antigenic Changes

- Antigenic Shift
  - Major change, new serotype
  - Caused by exchange of gene segments
  - May result in pandemic
- Example of antigenic shift
  - H2N2 virus circulated in 1957-67
  - H3N2 virus appeared in 1968 and completely replaced H2N2
  - H1N1 appeared in April 2009 and spread globally by May 2009 causing first pandemic since 1968

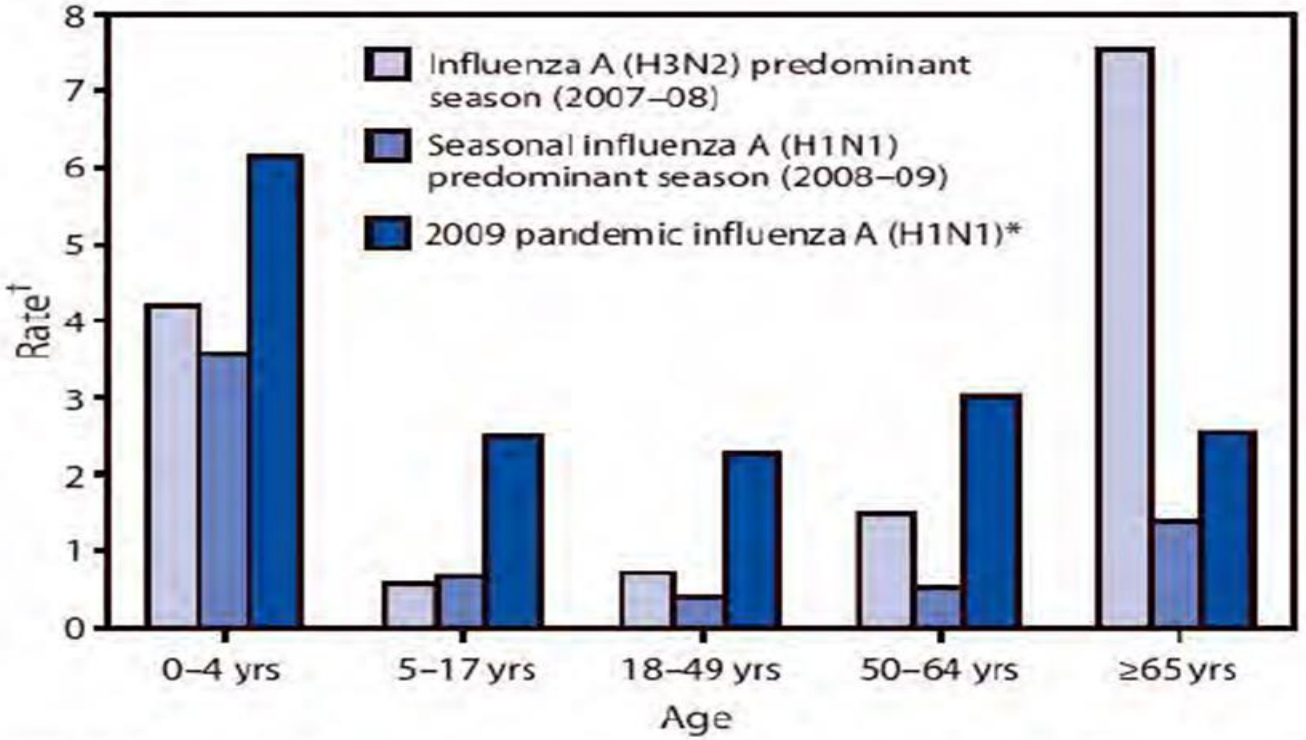
Influenza Antigenic Drift

- Antigenic Drift
  - Minor changes, same subtype
  - Caused by point mutations in gene
  - May result in epidemics
- Examples of antigenic drift
  - In 2002 2002-2003 A/Panama/2007/99 (H3N2) virus was dominant
  - A/Fujian/411/2002 (H3N2) appeared in late 2003 and caused widespread illness in 2003-2004

Influenza Type A Antigenic Shifts

Year	Subtype	Severity of Pandemic
1989	H3N2	Moderate
1918	H1N1	Severe
1957	H2N2	Severe
1968	H3N2	Moderate
1977	H1N1	Mild

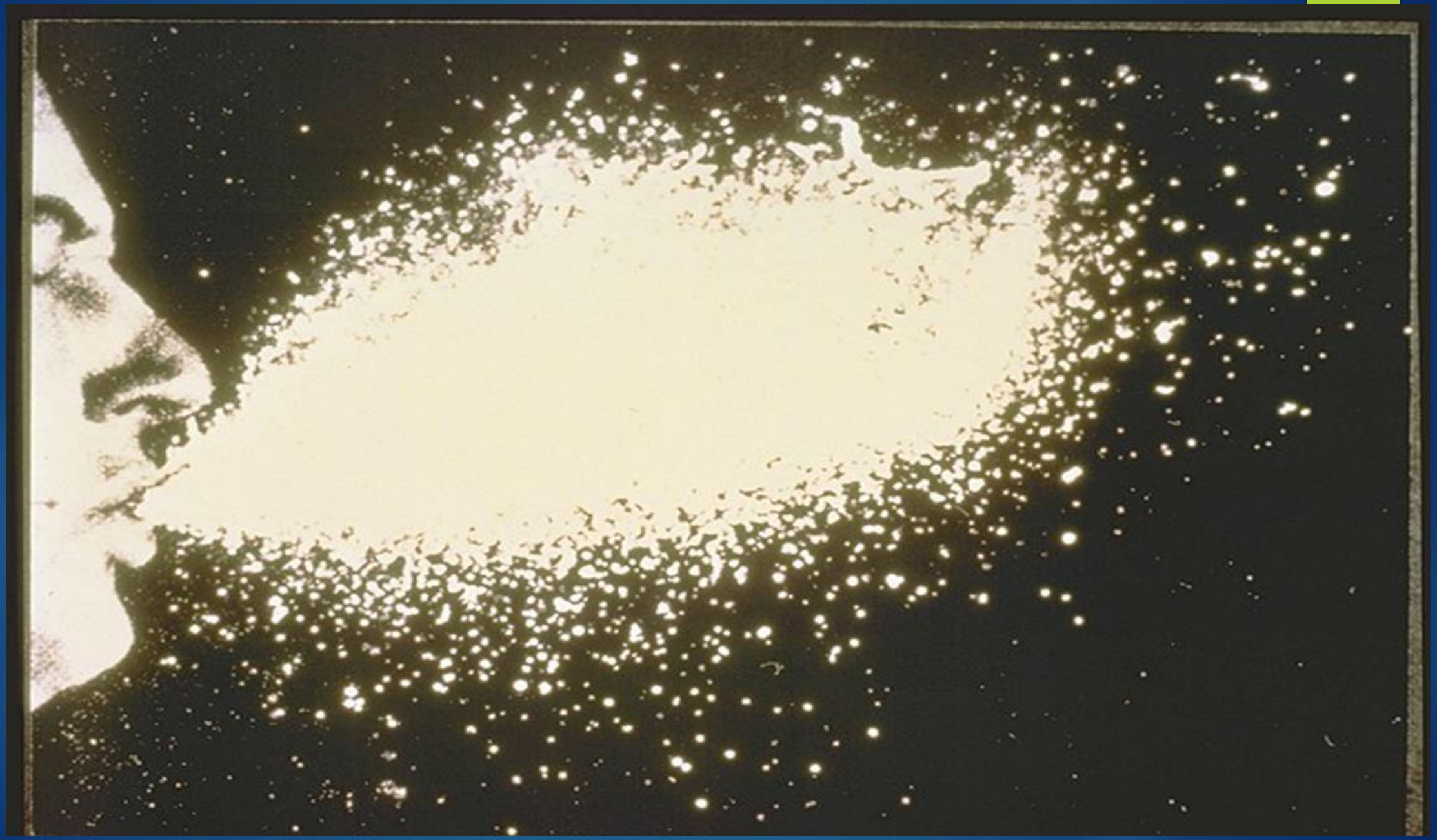
FIGURE 1. Cumulative rate of hospitalizations during three influenza seasons, by age group — Emerging Infections Program, United States, 2007–2010



* 2009 Pandemic Influenza A(H1N1) hospitalization data from September 1, 2009–January 21, 2010.
† Per 10,000 population.

Influenza Pathogenesis

- Respiratory transmission of virus
- Replication in respiratory epithelium with subsequent destruction of cells
- Viremia rarely documented
  - Aches and fever from immune response
- Viral shedding in respiratory secretions for 5-10 days



Influenza Clinical Features

- Incubation period 2 days
- Abrupt onset of fever, myalgia, sore throat, non-productive cough, headache
- Severity of illness depends on prior experiences with related variants

Epidemiology

- Most vulnerable patients
  - Age >65 and children <2 yrs of age
  - Underlying chronic conditions at any age
    - Heart and lung disease
    - Diabetes
    - Compromised immune system
- Secondary complications
  - Primary influenza viral pneumonia or secondary bacterial pneumonia
  - Exacerbation of underlying cardiac or pulmonary disease
  - Secondary or co-infection with other viral and bacterial pathogens
- Deaths .5-1 per 1000 cases

Impact of Influenza - United States

- Highest rates of complications and hospitalization among persons 65 years and older, young children, and persons of any age with certain underlying medical conditions
- Average of more than 200,000 influenza-related excess hospitalizations
- 37% of hospitalizations among persons younger than 65 years of age
- Greater number of hospitalizations during years that A(H3N2) is predominant

Special populations for Influenza

- Two main reasons for certain populations to be at high risk
- Immune deficiency either by age or condition
  - Results in inability to effectively reduce viral replication and spread
  - Results in inadequate response to vaccines
- Damaged respiratory track
  - COPD and asthma have impaired airways that are further damaged by viral infection

Influenza in Children

- Children commonly need medical care because of influenza, especially before they turn 5 years old.
  - Severe influenza complications are most common in children younger than 2 years old.
- Children with chronic health problems like asthma, diabetes and disorders of the brain or nervous system are at especially high risk of developing serious flu complications.
- Each year an average of 20,000 children under the age of 5 are hospitalized because of influenza complications.
- Last influenza season, more than 140 flu-related pediatric deaths were reported

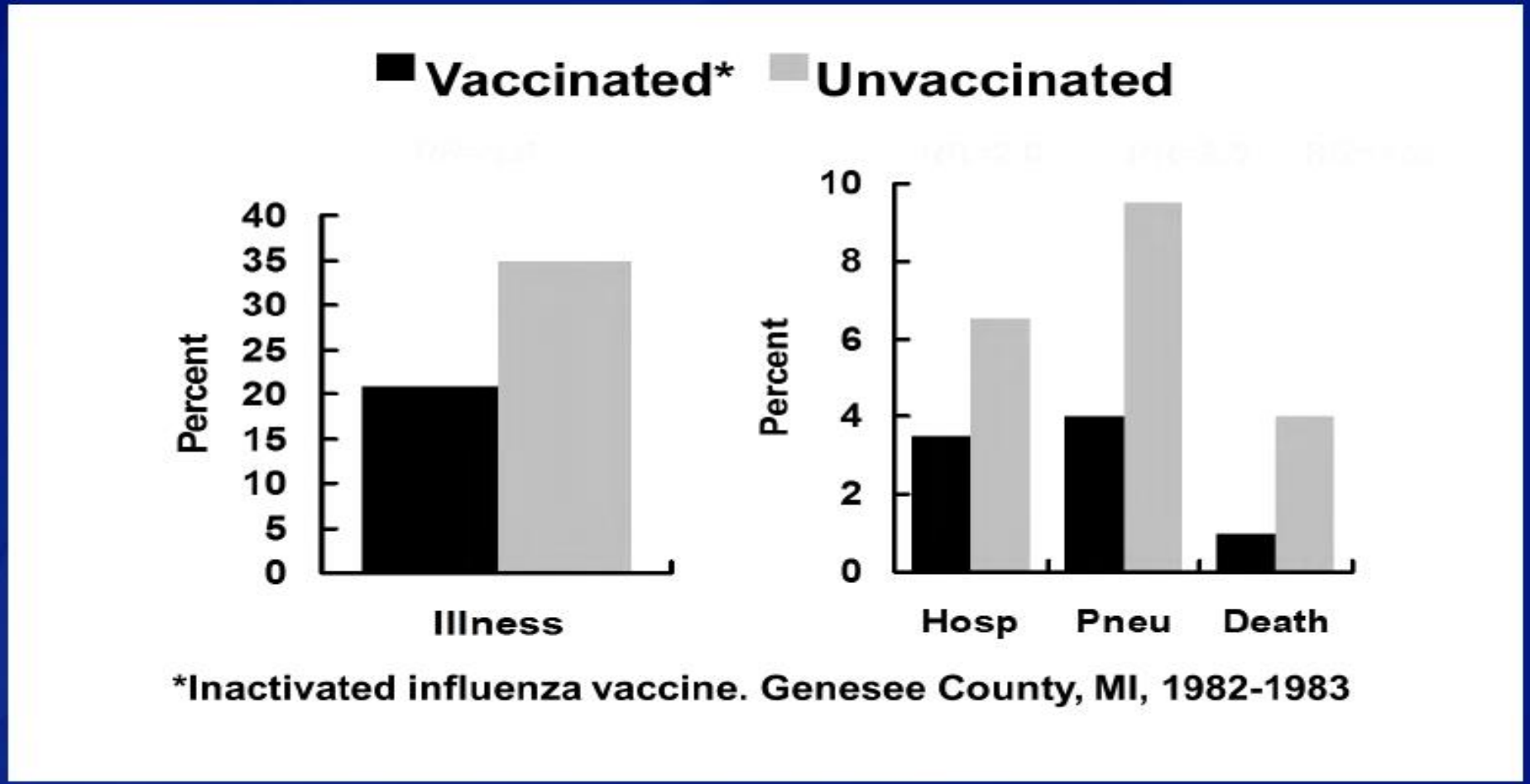
Why Emphasize Kids?

- Infants with higher morbidity and mortality with influenza
- Children act as major vectors for the transmission of influenza
  - Use of flu vaccine does impact community spread
- Children often have habits that facilitate transmission
  - Sharing toys, sneezing on others, etc.
- Presence of children the most important predictor of influenza in the household

Age over 65

- Human immune defenses become weaker with age.
- During most seasons, people 65 years and older bear the greatest burden of severe flu disease.
- In recent years, for example, it's estimated that between
  - 80 and 90 percent of seasonal flu-related deaths have occurred in people 65 year and older
  - 50 and 70 percent of seasonal flu-related hospitalizations have occurred among people in that age group.

Influenza and Complications Among Nursing Home Residents



*Inactivated influenza vaccine. Genesee County, MI, 1982-1983

Nursing Home Influenza

- Vaccinate all nursing home residents!!!!
- Health care personnel who get vaccinated help to reduce the following:
  - Transmission of influenza
  - Staff illness and absenteeism
  - Influenza-related illness and death, especially among people at increased risk for severe influenza illness
- Higher vaccination levels among personnel = a lower risk of health care facility-associated influenza cases.
- Influenza outbreaks in hospitals and long-term care facilities due to low influenza vaccination coverage among health care personnel.

Influenza Vaccination Recommendations 2017-2018

- *Routine annual influenza vaccination is recommended for all persons aged ≥6 months who do not have contraindications.*

Composition of the 2017-18 Influenza Vaccines

- 2017–18 U.S. trivalent influenza vaccines will contain an
  - A/Michigan/45/2015 (H1N1)pdm09–like virus,
  - A/Hong Kong/4801/2014 (H3N2)–like virus and
  - B/Brisbane/60/2008–like virus (Victoria lineage).
- Quadrivalent vaccines will include an additional vaccine virus strain, B/Phuket/3073/2013–like virus (Yamagata lineage).
- **This represents a change in the influenza A(H1N1)pdm09 virus component from the previous season.
- Good match for circulating early strains
  - Majority of viruses characterized antigenically and genetically similar to the cell-grown reference viruses representing the 2017 Southern Hemisphere and 2017–18 Northern Hemisphere influenza vaccine viruses
  - Of specimens tested from May 21 through September 23, 5321 were positive for influenza, including 2727 that were positive for influenza A viruses and 2594 that were positive for influenza B viruses. 86.4% were influenza A(H3N2) and 13.6% were influenza A(H1N1)pdm09. and 74.1% belonged to the B/Yamagata lineage and 25.9% belonged to the B/Victoria lineage.

Terminology

- The former abbreviation TIV (Trivalent Inactivated Influenza Vaccine) has been replaced with the new abbreviation IIV (*Inactivated Influenza Vaccine)*. IIVs as a class will include:
  - egg-based and cell culture-based trivalent inactivated influenza vaccines (IIV3),
  - egg-based quadrivalent inactivated influenza vaccine (IIV4).
  - Adjuvanted trivalent inactivitated influenza vaccine (aIIV3).
- RIV refers to recombinant influenza vaccine, available as a trivalent and quadrivalent formulation (RIV3/ RIV4).
- LAIV refers to live-attenuated influenza vaccine, available as a quadrivalent formulation (LAIV4)

Available Vaccines

- For the 2017–18 season, quadrivalent and trivalent influenza vaccines will be available.
  - Inactivated influenza vaccines (IIVs) will be available in trivalent (IIV3) and quadrivalent (IIV4) formulations.
  - Recombinant influenza vaccine (RIV) will be available in trivalent (RIV3) and quadrivalent (RIV4) formulations.
- Live attenuated influenza vaccine (LAIV4) is not recommended for use during the 2017–18 season
  - Concerns about its effectiveness against (H1N1)pdm09 viruses during the 2013–14 and 2015–16 seasons.
- *No preferential recommendation is made for one influenza vaccine product over another for persons for whom more than one licensed, recommended product is available.*

Influenza Vaccine changes

- Recent regulatory actions, including two new licensures and one labelling change
  - Afluria Quadrivalent (IIV4) licensed in August, 2016 for persons aged ≥18 years.
  - Flublok Quadrivalent (RIV4) licensed in October 2016 for persons aged ≥18 years..
- The age indication for FluLaval Quadrivalent (IIV4) was extended from ≥3 years to ≥6 months in November 2016.
  - Children aged 6 through 35 months may receive FluLaval Quadrivalent at the same 0.5 mL per dose (containing 15 µg of hemagglutinin [HA] per vaccine virus) as is used for older children and adults.
  - Additional option for vaccination of children aged 6 through 35 months, in addition to the previously available 0.25 mL per dose (containing 7.5 µg of HA per vaccine virus) of Fluzone Quadrivalent (IIV4)
- Adults with a history of egg allergy who have only hives after exposure to egg should receive age-appropriate inactivated influenza vaccine (IIV) or recombinant influenza vaccine (RIV).
- Adults with a history of egg allergy with symptoms other than hives (e.g., angioedema, respiratory distress, lightheadedness, or recurrent emesis, or who required epinephrine or another emergency medical intervention) may receive age-appropriate IIV or RIV. The selected vaccine should be administered in an inpatient or outpatient medical setting and supervised by a health care provider who is able to recognize and manage severe allergic conditions.

Influenza Immunization Targets

When vaccine supply is limited, vaccination efforts should focus on delivering vaccination to the following groups of persons:

- children aged 6 through 59 months;
- persons aged ≥50 years;
- persons with chronic pulmonary (including asthma) or cardiovascular (except isolated hypertension), renal, hepatic, neurologic, hematologic, or metabolic disorders (including diabetes mellitus);
- persons who are immunocompromised due to any cause (including immunosuppression caused by medications or by HIV infection);
- women who are or will be pregnant during the influenza season;
- children and adolescents (aged 6 months through 18 years) who are receiving aspirin- or salicylate-containing medications and who might be at risk for experiencing Reye syndrome after influenza virus infection;
- residents of nursing homes and other long-term care facilities;
- American Indians/Alaska Natives; and
- persons who are extremely obese (BMI ≥40).

Additional Population Targets

- Health care personnel;
  - physicians, nurses, and other workers in inpatient and outpatient-care settings
  - medical emergency-response workers (e.g., paramedics and emergency medical technicians)
  - employees of nursing home and long-term care facilities who have contact with patients or residents
  - Students
- Household contacts (including children) and caregivers:
  - children aged ≤59 months (i.e., aged <5 years)
  - adults aged ≥50 years, particularly contacts of children aged <6 months
  - with medical conditions that put them at high risk for severe complications from influenza.

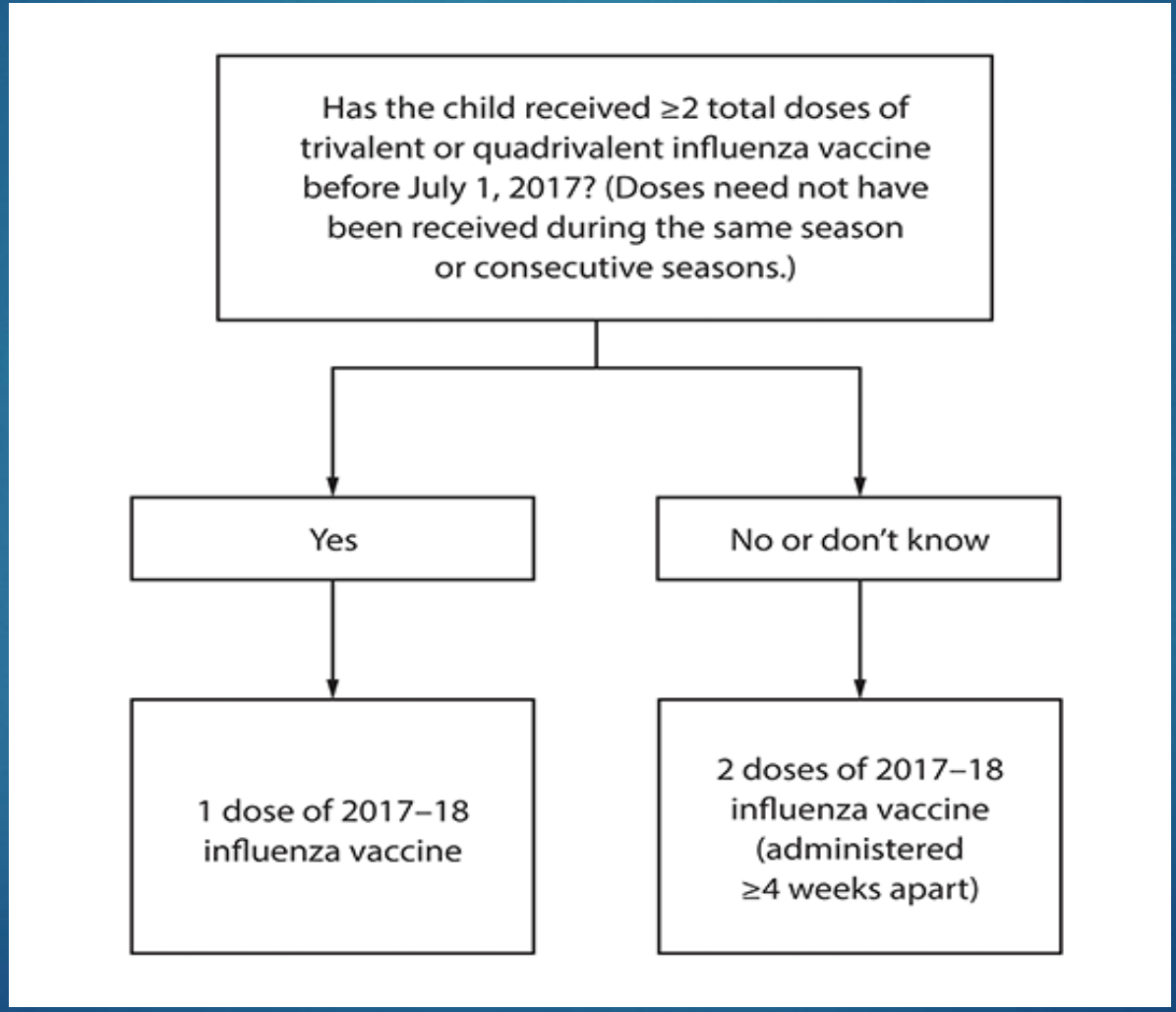
Older Adults

- For persons aged ≥65 years, any age-appropriate IIV formulation (standard-dose or high-dose, trivalent or quadrivalent, unadjuvanted or adjuvanted) or RIV are acceptable options.
  - Fluzone High-Dose (HD-IIV3)
    - superior efficacy to that of SD-IIV3 in a randomized trial conducted over two seasons among 31,989 persons aged ≥65 years, and might provide better protection than SD-IIV3 for this age group
  - Flublok Quadrivalent (RIV4)
    - analysis of data from a single-season randomized trial conducted among 8,604 adults aged ≥50 years, Flublok more efficacious than SD-IIV4 however, no claim of superiority was approved for the package insert.
  - Fluad (aIIV3)
    - more effective against laboratory-confirmed influenza than unadjuvanted SD-IIV3 among adults aged ≥65 years (N = 227) in an analysis from a small observational study.
- No preferential recommendation is made for any specific vaccine product. Vaccination should not be delayed if a specific product is not readily available.

Pregnancy and Inactivated Influenza Vaccine

- Pregnant women and their infants are at increased risk for serious influenza-related complications
  - premature labor, premature birth, low birthweight for gestational age, hospitalization, and maternal and fetal death
- Risk of hospitalization 4 times higher than non-pregnant women
- Vaccination of mothers with influenza vaccine decreases
  - risk for influenza-related illness in mothers
  - decrease the risk for influenza illness and influenza-related hospitalization among infants aged <6 mos.
- Vaccination (with IIV) recommended if pregnant during influenza season
  - Vaccination can occur during any trimester
  - Risk of complications comparable to non-pregnant women with high-risk medical conditions

Algorithm for administration to children 6 mos-8 yrs.



Efficacy Inactivated Influenza Vaccine

- About 60% effective among healthy persons younger than 65 years of age
- 50-60% effective in preventing hospitalization among elderly persons
  - Less effective in preventing disease
- 80% effective in preventing death among elderly persons
- Dependent on matching strains in vaccine and no seasonal drift

Inactivated Influenza Vaccine Adverse Reactions

- Local reactions (soreness, redness)
  - 15%-20%
- Fever, malaise, myalgia
  - less than 1%
- Allergic reactions (hives, angioedema, anaphylaxis)
  - rare

Contraindications and precautions to the use of influenza vaccines — United States, 2017–18 influenza season

Vaccine type	Contraindications	Precautions
IIV	• History of severe allergic reaction to any component of the vaccine† or after previous dose of any influenza vaccine	• Moderate-to-severe acute illness with or without fever • History of Guillain-Barré syndrome within 6 weeks of receipt of influenza vaccine
RIV	• History of severe allergic reaction to any component of the vaccine	• Moderate-to-severe acute illness with or without fever • History of Guillain-Barré syndrome within 6 weeks of receipt of influenza vaccine
LAIV For the 2017–18 season, ACIP recommends that LAIV not be used. Content is provided for information.	• History of severe allergic reaction to any component of the vaccine† or after a previous dose of any influenza vaccine • Children aged 2 through 4 years who have received a diagnosis of asthma • Children and adults who are immunocompromised due to any cause (including immunosuppression caused by medications or by HIV infection) • Close contacts and caregivers of severely immunosuppressed persons who require a protected environment • Pregnancy • Receipt of influenza antiviral medication within the previous 48 hours	• Moderate-to-severe acute illness with or without fever • History of Guillain-Barré syndrome within 6 weeks of receipt of influenza vaccine • Asthma in persons aged ≥5 years • Other underlying medical conditions that might predispose to complications after wild-type influenza infection (e.g., chronic pulmonary, cardiovascular [except isolated hypertension], renal, hepatic, neurologic, hematologic, or metabolic disorders [including diabetes mellitus])

So, how do we do with Influenza vaccination?

- **≥1 Dose Among Children Aged 6 Months–17 Years**
- **Overall Trends :**Influenza vaccination coverage among children aged 6 months–17 years increased significantly from 31.1% in the 2007–08 influenza season to 56.7% in the 2011–12 season as measured by NHIS (test for trend, $p<0.05$)
- **Coverage Among Adults Aged ≥18 Years**
- **Overall Trends**: Influenza vaccination coverage among adults aged ≥18 years increased from 33.0% in the 2007–08 season to 38.3% in the 2011–12 season as measured by NHIS (test for trend, $p<0.05$).
  - Data also used from BRFSS and NFS surveys

Race/Ethnicity, 2011–12 Influenza Season

- Children: Vaccination coverage during the 2011–12 season among non-Hispanic blacks for most age groups (6 months–17 years, 5–12 years, and 13–17 years) and Hispanics in all age groups was significantly higher than among non-Hispanic whites as measured by NIS.
  - As measured by NFS, among children overall and for age groups ≤4 years, Hispanics had higher coverage than non-Hispanic whites.
- Adults: Vaccination coverage among non-Hispanic blacks for all age groups and Hispanics for two age groups (≥18 years and 18–64 years) was significantly lower compared with non-Hispanic whites as measured by NFS, BRFSS.

Impact Opportunities

- Vaccination coverage for adults aged ≥65 years was 65%–70% in 2011–12 and has remained relatively constant
  - Increase use of alternative settings (e.g., community settings such as senior center, churches, and malls), health department clinics, pharmacies, and educational settings
  - Following universal recommendations =higher coverage among contacts of older adults
    - Better protection of frail older adult populations in whom the effectiveness of the vaccine is unclear
- Vaccination coverage among most adult age groups of non-Hispanic blacks and Hispanics was significantly lower than among non-Hispanic whites.
  - Broad use of interventions to remove barriers to access
  - Interventions that make it a routine practice to offer vaccinations in health-care and other settings
  - Measures to reduce disparities might be most important for adults aged ≥50 years because the racial/ethnic disparities in adults aged 18–49 years and children aged 6 months–17 years are smaller

Impacts on Vaccine Uptake

- Perceptions of vaccine effectiveness, disease risk and vaccine safety impact use of influenza vaccines
  - Opinions about vaccine safety associated with sociodemographic characteristics
  - Health-care providers, community leaders, and community and faith-based organizations should use effective strategies, including social media, to improve the accuracy of perceptions of influenza vaccination
- Physician contacts and recommendations play an important role in vaccination rates
  - Issues: In one study, of those who had contact with a physician during the influenza season, only 44% patients received a vaccination recommendation from a health-care provider.
  - Studies have shown that health-care provider recommendations can override a patient's negative opinions about the influenza vaccination
- *Health-care providers should be encouraged to take every opportunity to recommend and administer the influenza vaccine to patients.*

Strategies to Increase Influenza Vaccine Use

- Standing orders to administer vaccine from October-March for inpatient and outpatient facilities
- Vaccinate patients being visited at home
- Go off site to deliver vaccines where people are
  - Community Clinics: Drive by clinics one of my personal favorites
  - Grocery stores with Pharmacies
  - In office administration
- Health provider recommendations
- Fun and convincing marketing, social media blogs, posters, etc.

Staying Healthy

- Get vaccinated and show others how to do it!!
- However, since vaccines are neither 100% effective nor 100% safe also remember to:
  - Wash hands
  - Cover coughs
  - Stay home if you are ill