Influenza Impact and Updates

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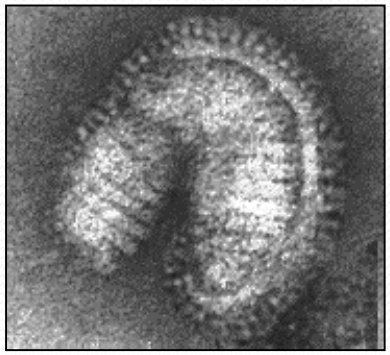
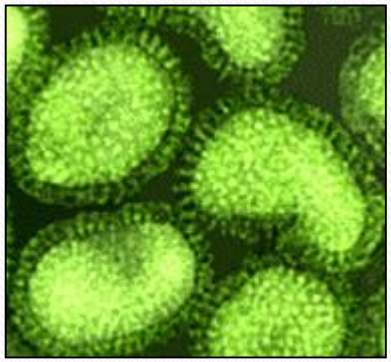
I have no relevant financial disclosures and will not discuss non-FDA approved treatments

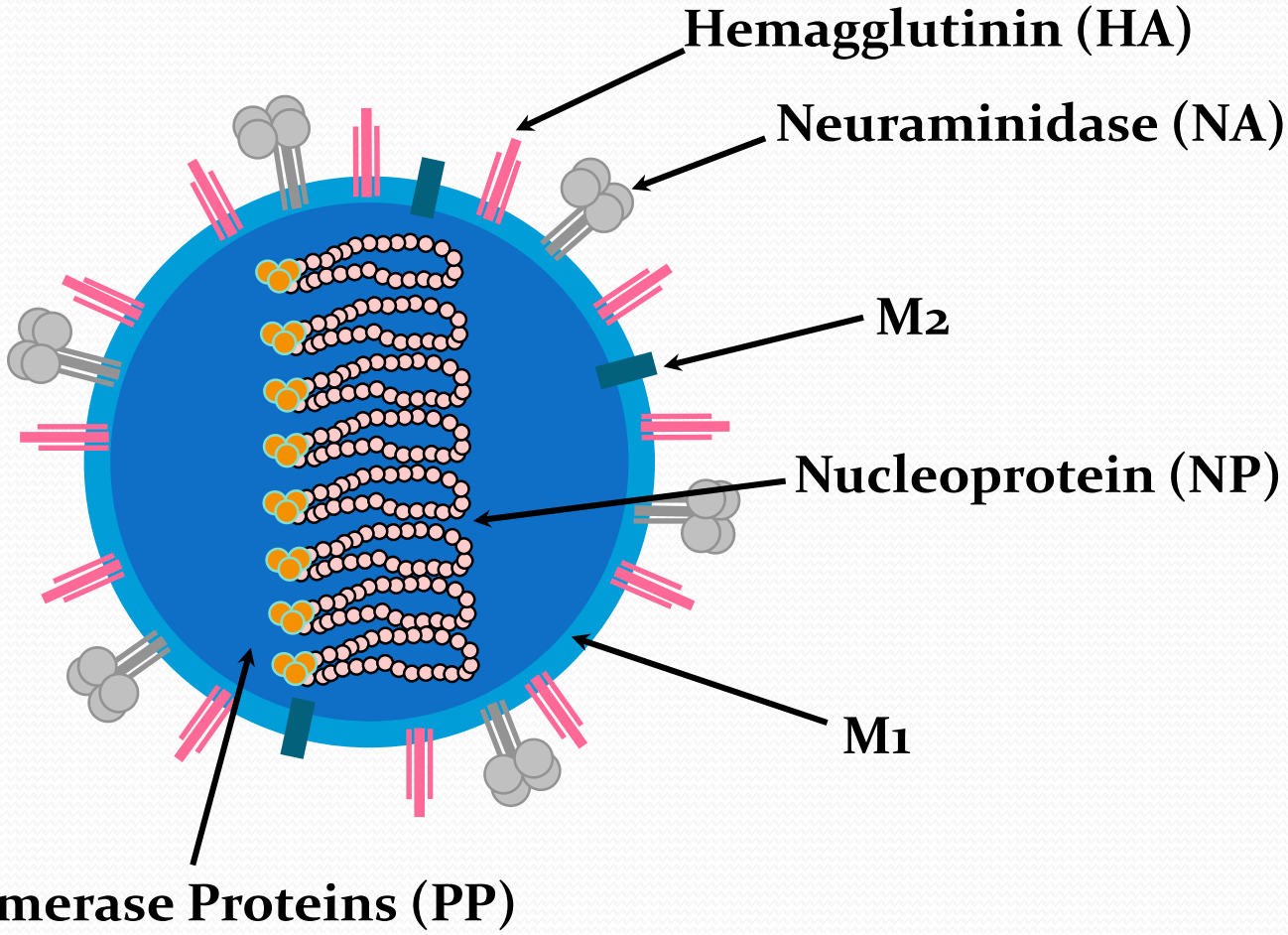
Objectives

- Discuss the impact of influenza upon children and their close contacts.
- Review the updated recommendations from Centers of Disease Control and Prevention (CDC) and the American Academy of Pediatrics (AAP) for the 2013-2014 influenza season.
- Learn about new influenza vaccine options for 2013-14.

Structure of the Influenza Virus







Adapted from: Hayden FG, Palese P. *Clinical Virology.* 6th ed. 1997:911-942.

Antigenic Drift and Shift

Drift

- Minor change, within subtype
- Point mutations
- Occurs in A and B subtypes
- Can cause an epidemic

Occurs Continuously

Shift

- Major change, new subtype
- Exchange of gene segments
- Occurs in A subtypes only
- Can cause a pandemic

Occurs Infrequently

Cox NJ, et al. *Lancet.* 1999;354:1277-1282.

Routine Vaccination Has Significantly Reduced Morbidity in the United States

Disease	Baseline Morbidity Prior to Routine Vaccination	Estimated Baseline Morbidity Following Routine Vaccination	% Decrease
Diphtheria	175,885[1]	1[1]	99.99
***Haemophilus influenza* type B**	20,000[1]	140[2]	99.30
Hepatitis B	27,000[3,4*]	5,000[2]	81.50
Measles	503,282[1]	70[2]	99.99
Mumps	152,209[1]	300[2]	99.80
Pertussis	147,271[1]	26,000[2]	82.35
Poliomyelitis (paralytic)	16,316[1]	1[2]	99.99
Rubella	47,745[1]	10[2]	99.98
Tetanus	1314[1]	30[2]	97.72

*Estimates adjusted for current US population of 300 million.[4]

1. CDC. *MMWR.* 1999;48(RR12):243-248.
2. CDC. *MMWR.* 2006:55(RR32):880-881.
3. CDC. *MMWR.* 1999;48(RR12):1-101.
4. U.S. Census Bureau. www.census.gov/main/www/popclock.html. Accessed March 2, 2008.

Influenza Is a Leading Cause of Vaccine-preventable Disease in the US

Reported Estimated Annual Cases	
Hepatitis B[1]	4000
Meningococcal disease[2]	2000-3000
Pertussis[1]	> 9,000
Varicella[1a]	35,000

Estimated Annual Cases	
Pneumococcal disease[1]	40,000
Hepatitis A[1]	20,000

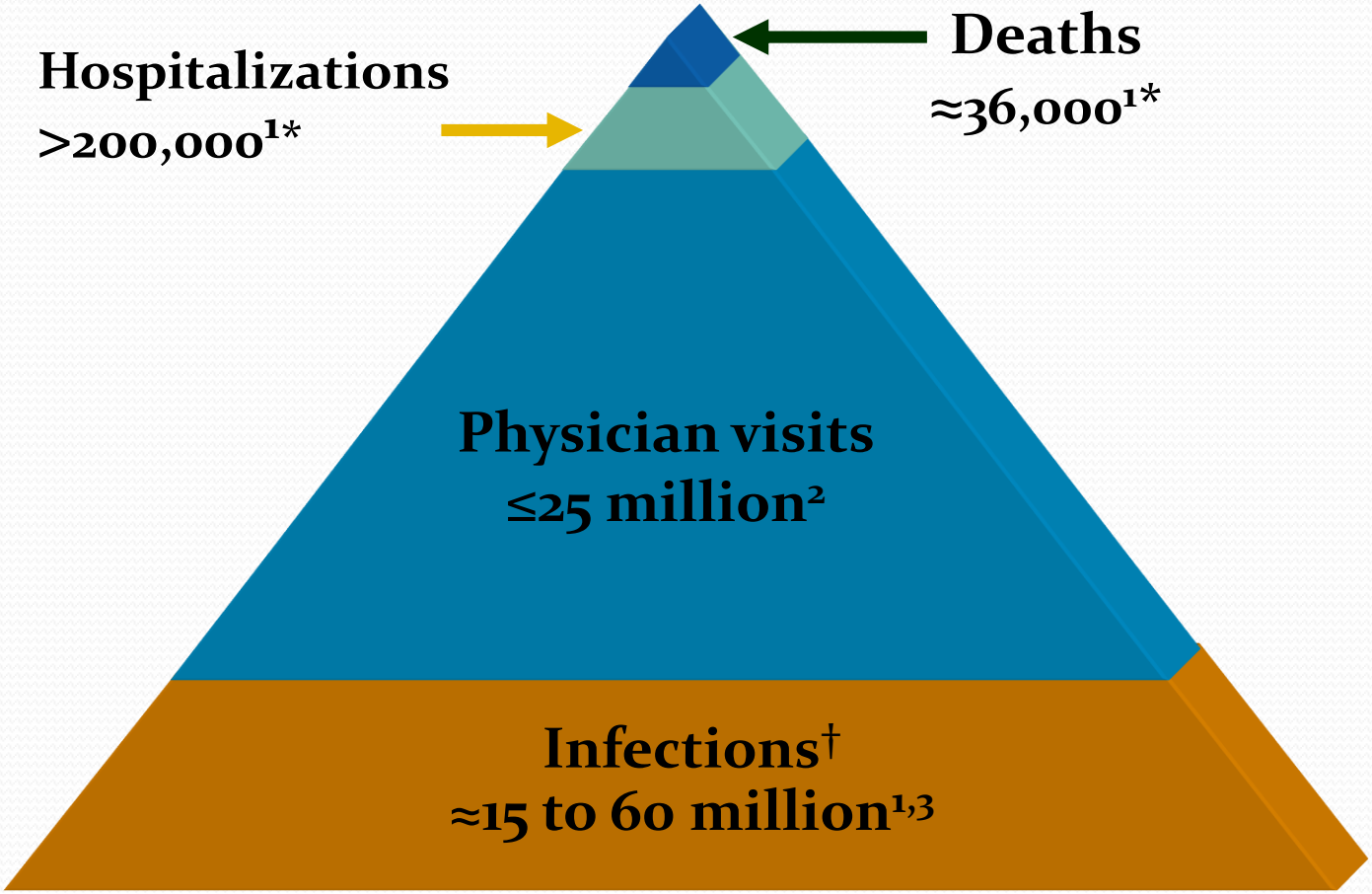
Estimated Annual Cases of Illness	
Influenza[3,4]	15,000,000 to 60,000,000[b]

[a]Varicella was removed from the nationally notifiable disease list in 1991. In 2006, varicella cases were reported from 28 states, the District of Columbia, and Puerto Rico.

[b]Estimated value based on current US Census of 300,000,000.[4]

1. CDC. *Pink Book*. 10th ed. 2007. http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/G/cases&deaths.pdf. Accessed April 24, 2008.
2. CDC. *Pink Book*. 10th ed. 2007. http://www.cdc.gov/vaccines/pubs/pinkbook/pink-chapters.htm. Accessed April 24, 2008.
3. CDC. Influenza (flu) fact sheet. http://www.cdc.gov/flu/keyfacts.htm. Accessed April 24, 2008.
4. U.S. Census Bureau. http://www.census.gov/main/www/popclock.html. Accessed April 24, 2008.

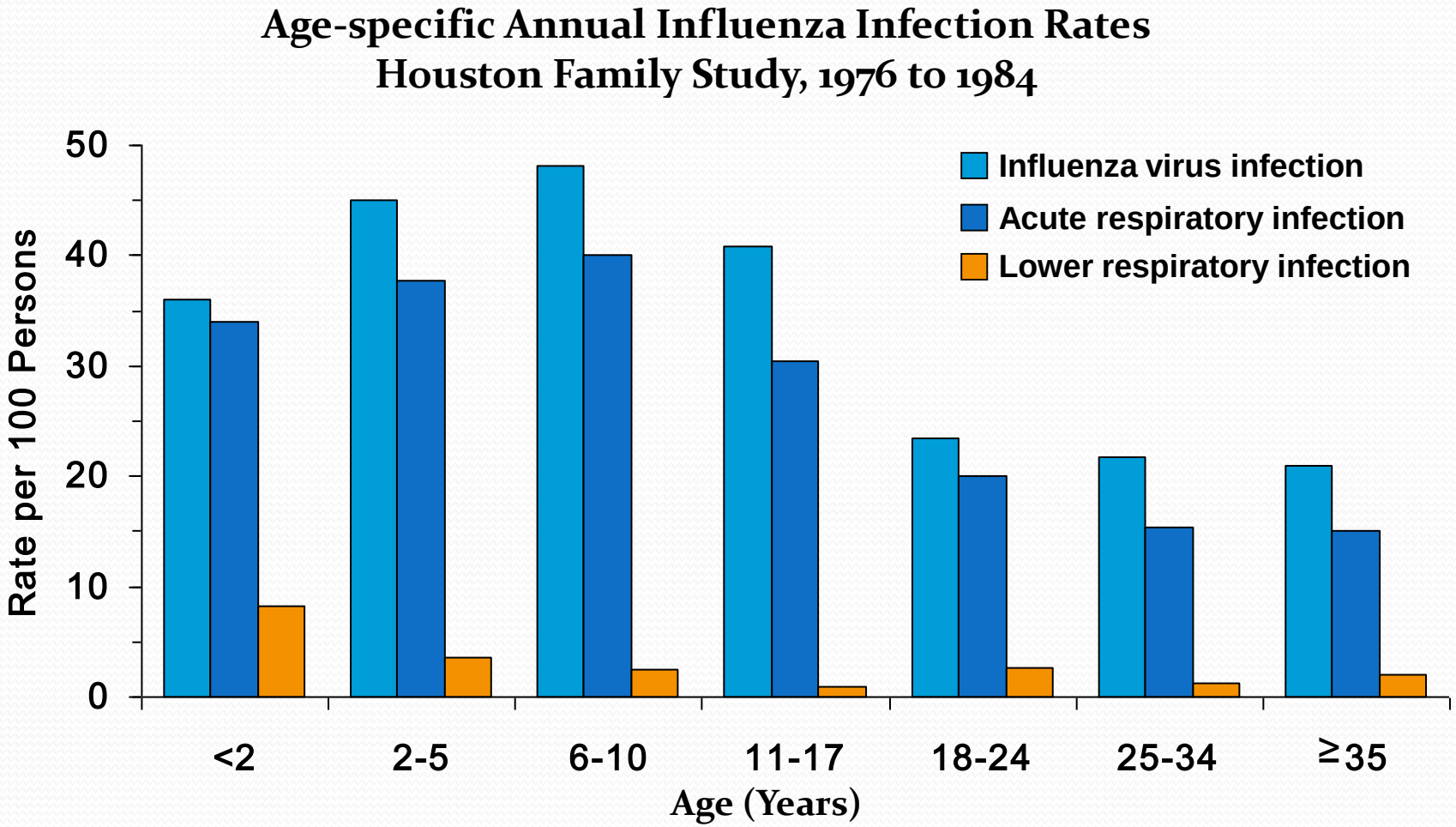
Influenza Affects Millions of People Each Year in the United States



*All-cause hospitalization and mortality associated with influenza virus infection.
†Includes symptomatic and asymptomatic infections.

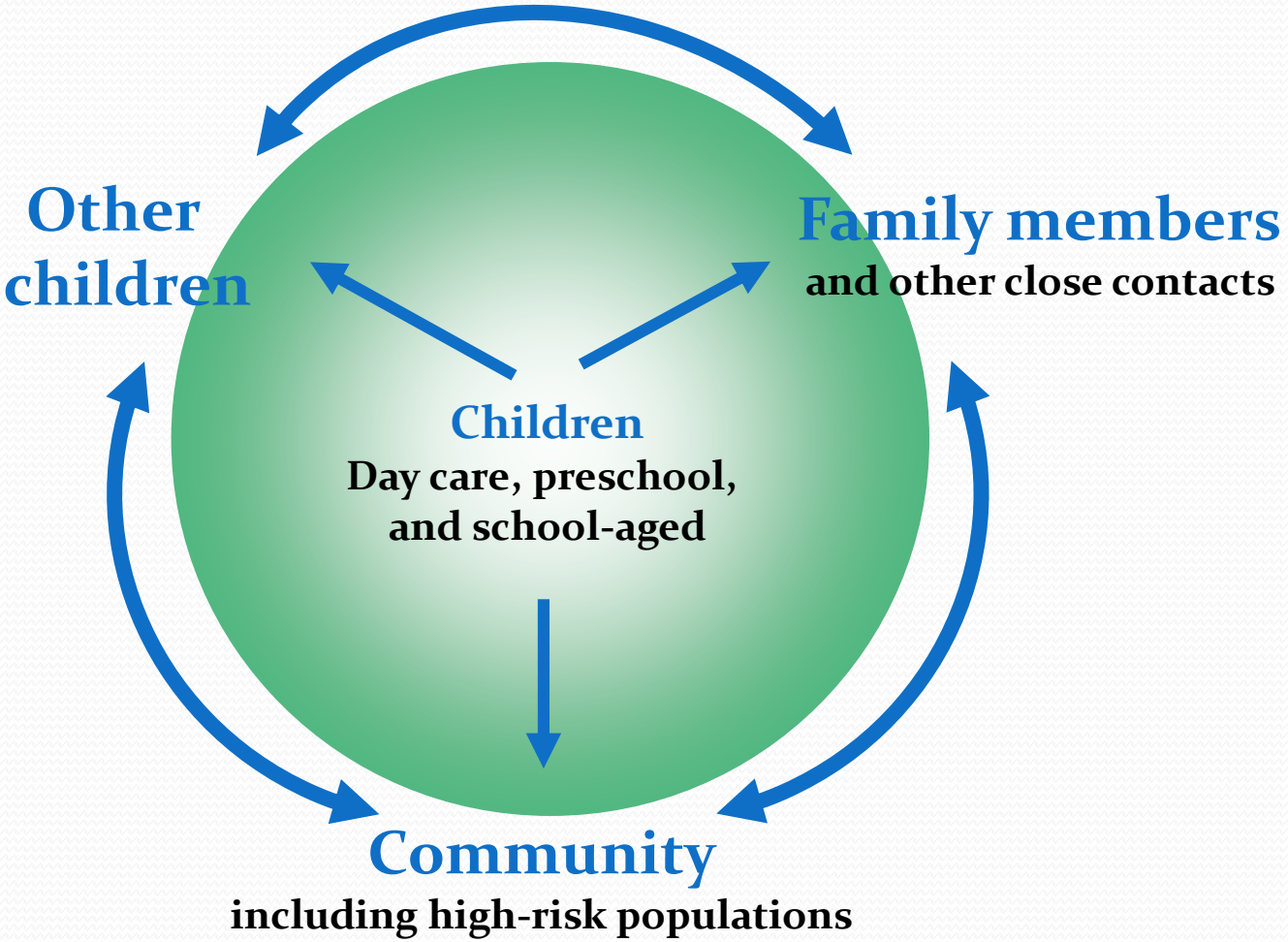
1. CDC. Influenza (flu) Fact Sheet. http://www.cdc.gov/flu/keyfacts.htm. Accessed April 24, 2008.
2. Couch RB. *Ann Intern Med*. 2000;133:992-998.
3. U.S. Census Bureau. http://www.census.gov/main/www/popclock.html. Accessed April 24, 2008.

Influenza Is Most Prevalent in Children



Glezen WP, et al. *Pediatr Infect Dis J*. 1997;16:1065-1068.

Children are Primary Vectors



1. Glezen WP, et al. *N Engl J Med*. 1978;298:587-592.
2. Weycker D, et al. *Vaccine*. 2005;23:1284-1293.

Children Play a Significant Role in Spreading Influenza

- Influenza attack rates are highest in children[1]
- Children adhere less to cough-and-sneeze etiquettes
- Children shed influenza longer than adults[2]
  - Children may be infectious (type B virus) for more than 10 days[2]
  - Young children may shed virus (type A virus) for up to 8 days prior to appearance of symptoms[3]

1. Glezen WP, et al. *Pediatr Infect Dis J*. 1997;16:1065-1068.
2. CDC. *MMWR*. 2007;56(RR-6):1-54.
3. Frank AL, et al. *J Infect Dis.*1981;144:433-441.

Influenza Pediatric Mortality

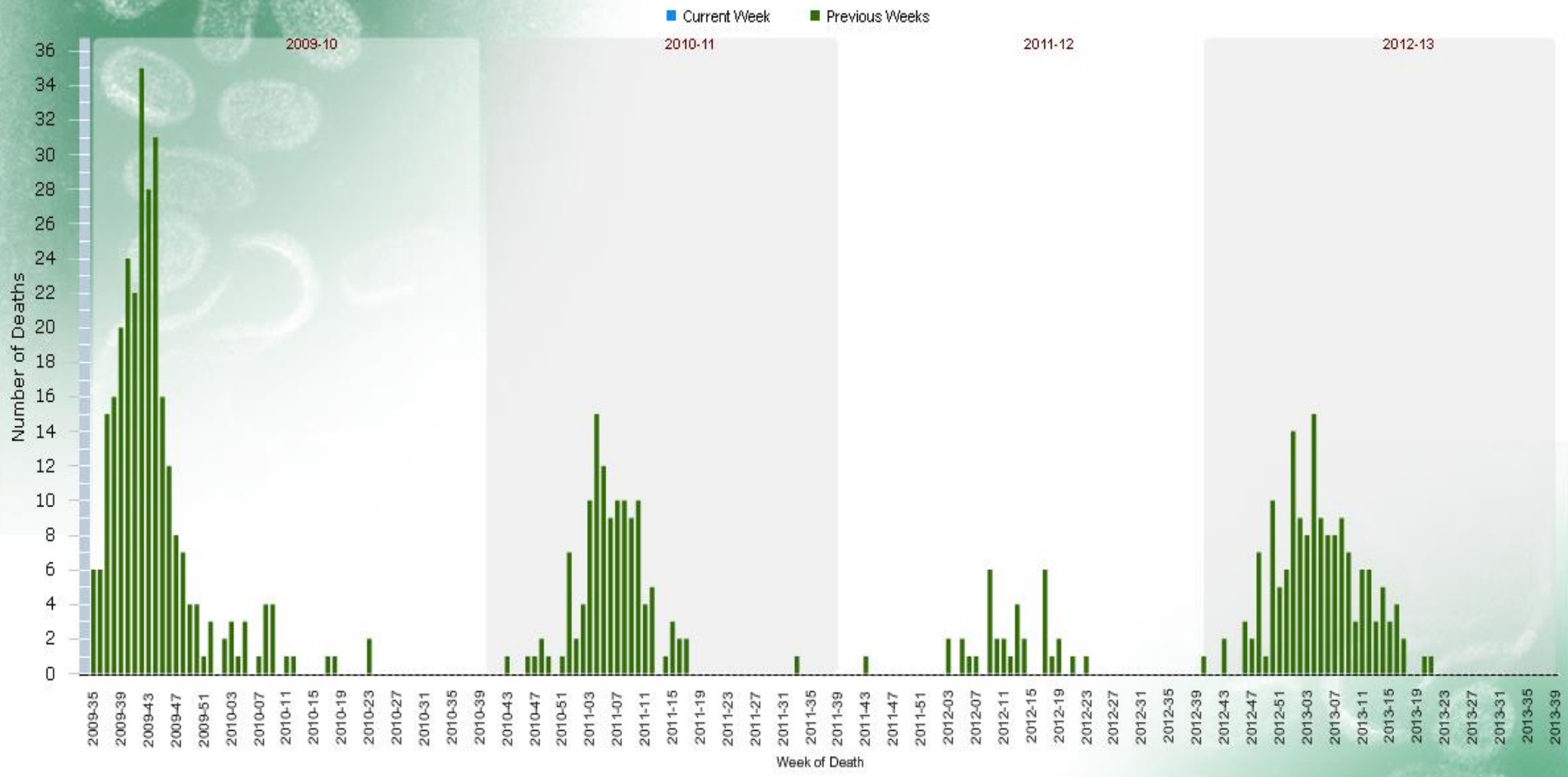
- Influenza-associated deaths are uncommon among children but represent a substantial proportion of vaccine-preventable deaths[1]
- Deaths attributable to influenza are far less common in children than in the elderly[2]

1. CDC. *MMWR*. 2007;56(RR-6):1-54.
2. AAP. Policy statement. *Pediatrics*. 2008;121;e1016-e1031. http://pediatrics.aappublications.org/cgi/reprint/121/4/e1016. Accessed May 19, 2008.

FLUVIEW

CDC

Number of Influenza-Associated Pediatric Deaths by Week of Death

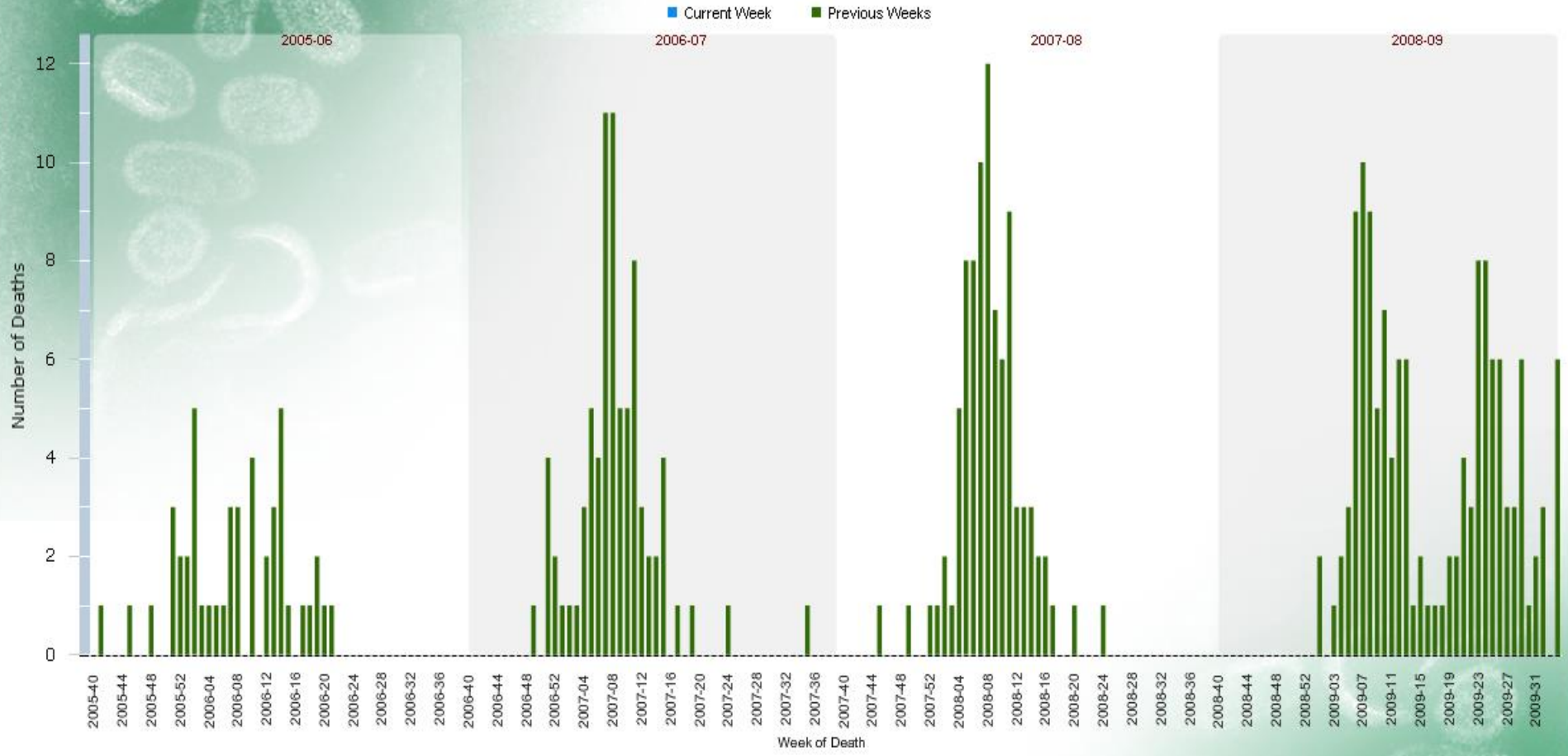


Season	Total Deaths	Deaths Reported During the Week Ending 16 Aug 2013
2009-10	282	0
2010-11	123	0
2011-12	35	0
2012-13	158	0

FLUVIEW

CDC

Number of Influenza-Associated Pediatric Deaths by Week of Death



Season	Total Deaths	Deaths Reported During the Week Ending 16 Aug 2013
2005-06	46	0
2006-07	77	0
2007-08	88	0
2008-09	133	0

Influenza Pediatric Mortality

- Deaths of children aged < 18 years in 2009-12
  - Pandemic flu (shifted strain) resulted in increased pediatric mortality subsequently
- MRSA-influenza cases where children died, 2006 to 2007[2]
  - Of the 22 influenza deaths reported with *S. aureus,* 15 children had infections with methicillin-resistant *S. aureus* (MRSA)
  - Compared to previous 2 influenza seasons[3]
    - Increase in proportion with invasive MRSA-associated co-infection from <5% to 27%

1. CDC. Health Advisory. http://www2a.cdc.gov/HAN/ArchiveSys/ViewMsgV.asp?AlertNum=00268. Accessed April 24, 2008.
2. CDC. Advisory Committee on Immunization Practices. June 28, 2007. http://www.cdc.gov/vaccines/recs/ACIP/downloads/mtg-slides-jun07/26-influenza1-fiore.pdf. Accessed April 24, 2008.

Influenza Pediatric Mortality in 2003-2004

US influenza season began earlier than most seasons and was moderately severe (153 deaths reported)[1,2]

% of Deaths by Age[2]

<6 months	12%
6 to 11 months	8%
1 year	20%
2 to 4 years	23%
5 to 10 years	17%
11 to 17 years	20%

% of Deaths by Health Status[2]

ACIP high-risk condition	33%
Other underlying medical condition (not defined by ACIP as high risk)	20%
Previously healthy	47%

The predominant viruses circulating were mismatched influenza A (H3N2), a subtype associated with increased morbidity and mortality[2]

1. CDC. Flu activity. http://www.cdc.gov/flu/weekly/fluactivity.htm. Accessed March 2, 2008.
2. Bhat N, et al. *N Engl J Med*. 2005;353:2559-2567.

Influenza-Associated Pediatric Deaths 2012-13 Season

- •73 (54%) of children had influenza B infections
- •68% of children were 5 years of age or older
- •56% had a high risk condition

Economic Burden of Influenza in the US*

- Total annual economic burden of influenza epidemics in the US across all age groups was $87.1 billion
- $1.7 billion spent for medical costs in children and an additional $2.1 billion in indirect costs
- 7.4 million outpatient visits and 302,000 hospitalized days

*Based on 2003 US population.

Molinari et al. *Vaccine.* 2007;25:5086-5096.

Conclusions: Influenza Disease Burden

- Burden of influenza in children is significant and also extends to their household contacts and community
  - Influenza infection is most prevalent in children
  - Children are often the vector for spread amongst contacts
  - Influenza deaths are more common in the elderly but influenza deaths represent a significant percentage of pediatric vaccine-preventable deaths in the US
  - The economic burden of influenza is great
- Improved vaccination rates in children may help reduce the burden of influenza disease

2013-14 ACIP Recommendations

- **Abbreviations:**
  - The former abbreviation TIV (Trivalent Inactivated Influenza Vaccine, previously used for inactivated influenza vaccines) has been replaced with the new abbreviation IIV (Inactivated Influenza Vaccine). For 2013-14, IIVs as a class will include:
    - egg-based and cell culture-based trivalent inactivated influenza vaccines (IIV3), and
    - egg-based quadrivalent inactivated influenza vaccine (IIV4).
  - RIV refers to recombinant hemagglutinin influenza vaccine, available as a trivalent formulation (RIV3) for 2013-14;
  - LAIV refers to live-attenuated influenza vaccine, available as a quadrivalent formulation (LAIV4) for 2013-14.
  - LAIV, IIV, and RIV denote vaccine categories; numeric suffix specifies the number of antigens in the vaccine.
  - Where necessary to refer specifically to cell culture-based vaccine, the prefix “cc” is used (e.g., “ccIIV3”).

2013-14 ACIP Recommendations

- Routine annual influenza vaccination of all persons aged 6 months and older continues to be recommended
- Timing:
  - In general, health-care providers should begin offering vaccination soon after vaccine becomes available, and if possible, by October
  - All children aged 6 months--8 years who are recommended for 2 doses should receive their first dose as soon as possible after vaccine becomes available; these children should receive the second dose ≥4 weeks later

2013-14 ACIP Recommendations

- Vaccine composition:
  - 2013-14 U.S. trivalent influenza vaccines will contain an A/California/7/2009 (H1N1)-like virus, A/Texas/50/2012 (H3N2) virus, and a B/Massachusetts/2/2012-like virus.
  - Quadrivalent vaccines will include an additional vaccine virus, a B/Brisbane/60/2008-like virus

2013-14 ACIP Recommendations

- Several new, recently-licensed vaccines will be available for the 2013-14 season, and are acceptable alternatives to other licensed vaccines indicated for their respective age groups when otherwise appropriate
- Within approved indications and recommendations, no preferential recommendation is made for any type or brand of licensed influenza vaccine over another

2013-14 ACIP Recommendations

- **Persons at Risk for Medical Complications Due to Influenza**

  Vaccination to prevent influenza is particularly important for persons who are at increased risk for severe complications from influenza, or at higher risk for influenza-related outpatient, emergency department, or hospital visits. When vaccine supply is limited, vaccination efforts should focus on delivering vaccination to the following persons (no hierarchy is implied by order of listing):

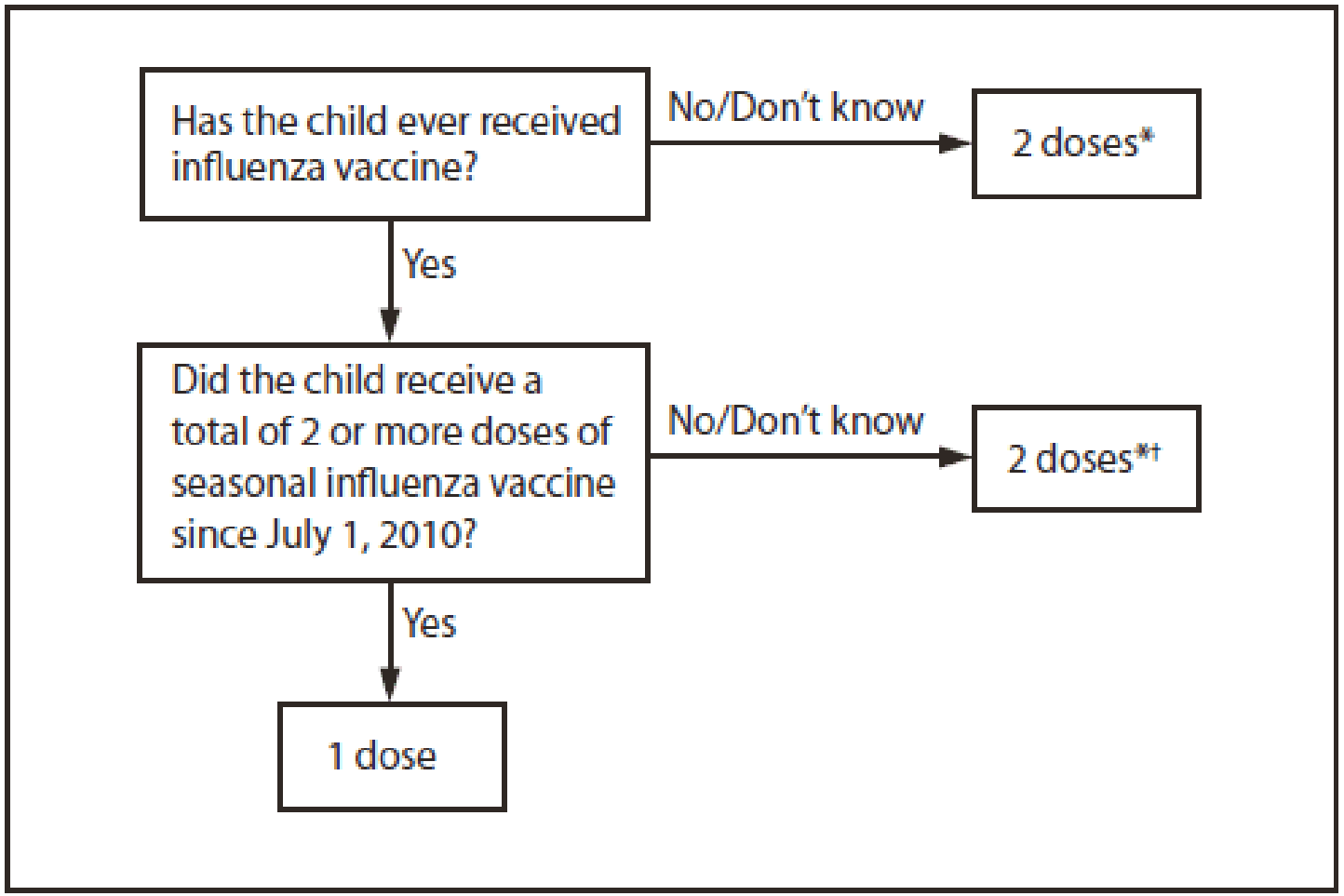
  - All children aged 6 through 59 months;
  - All persons aged ≥50 years;
  - Adults and children who have chronic pulmonary (including asthma) or cardiovascular (except isolated hypertension), renal, hepatic, neurological, hematologic, or metabolic disorders (including diabetes mellitus);
  - Persons who have immunosuppression (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--18 years) who are receiving long-term aspirin therapy and who might be at risk for experiencing 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).

2013-14 ACIP Recommendations

Persons Who Live With or Care for Persons at Higher Risk for Influenza-Related Complications

- Continued emphasis should be placed on vaccination of persons who live with or care for persons at higher risk for influenza-related complications. When vaccine supply is limited, vaccination efforts should focus on delivering vaccination to persons at higher risk for influenza-related complications listed above, as well as these persons:
  - Healthcare personnel (HCP);
  - Household contacts (including children) and caregivers of children aged ≤59 months (i.e., aged <5 years) and adults aged ≥50 years, with particular emphasis on vaccinating contacts of children aged <6 months; and
  - Household contacts (including children) and caregivers of persons with medical conditions that put them at higher risk for severe complications from influenza.
- HCP and persons who are contacts of persons in these groups and who are not contacts of severely immunocompromised persons (those living in a protective environment) may receive any influenza vaccine which is otherwise indicated. Individuals who care for the severely immunocompromised should receive either IIV or RIV3.

Influenza vaccine dosing algorithm for children aged 6 months through 8 years — Advisory Committee on Immunization Practices, United States, 2013–14 influenza season



* Doses should be administered at least 4 weeks apart.

Alternative Approach (Dose Determination): Age 6 months to 8 years

- In settings where adequate vaccination history from prior to the 2010-11 season is available, a second approach may be used. By this approach, if a child 6 months through 8 years of age is known to have received at least 2 doses of seasonal influenza vaccine during any prior season, and at least 1 dose of a 2009(H1N1)-containing vaccine--i.e., 2010-11, 2011-12, or 2012-13 seasonal vaccine or the monovalent 2009(H1N1) vaccine--then the child needs only 1 dose for 2013-14. Using this approach, children 6 months through 8 years of age need only 1 dose of vaccine in 2013-14 if they have received any of the following:
  - 2 or more doses of seasonal influenza vaccine since July 1, 2010 or;
  - 2 or more doses of seasonal influenza vaccine before July 1, 1010 and 1 or more doses of monovalent 2009(H1N1) vaccine or;
  - 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

2013-14 ACIP Recommendations

- **Influenza Vaccination for Pregnant Women**
  - Women who are or will be pregnant during influenza season should receive IIV. Live attenuated influenza vaccine (LAIV) is not recommended for use during pregnancy.
  - Postpartum women can receive either LAIV or IIV.
  - Pregnant and postpartum women do not need to avoid contact with persons recently vaccinated with LAIV.

2013-14 ACIP Recommendations

- **Influenza Vaccination of Persons with a History of Egg Allergy**
  - Persons with a history of egg allergy who have experienced only hives after exposure to egg should receive influenza vaccine. Because relatively little data are available for use of LAIV in this setting, IIV or RIV should be used. RIV is egg-free and may be used for persons aged 18-49 years who have no other contraindications. However, IIV (egg- or cell-culture based) may also be used, with the following additional safety measures:
    - Vaccine should be administered by a healthcare provider who is familiar with the potential manifestations of egg allergy; and
    - Vaccine recipients should be observed for at least 30 minutes for signs of a reaction after administration of each vaccine dose.

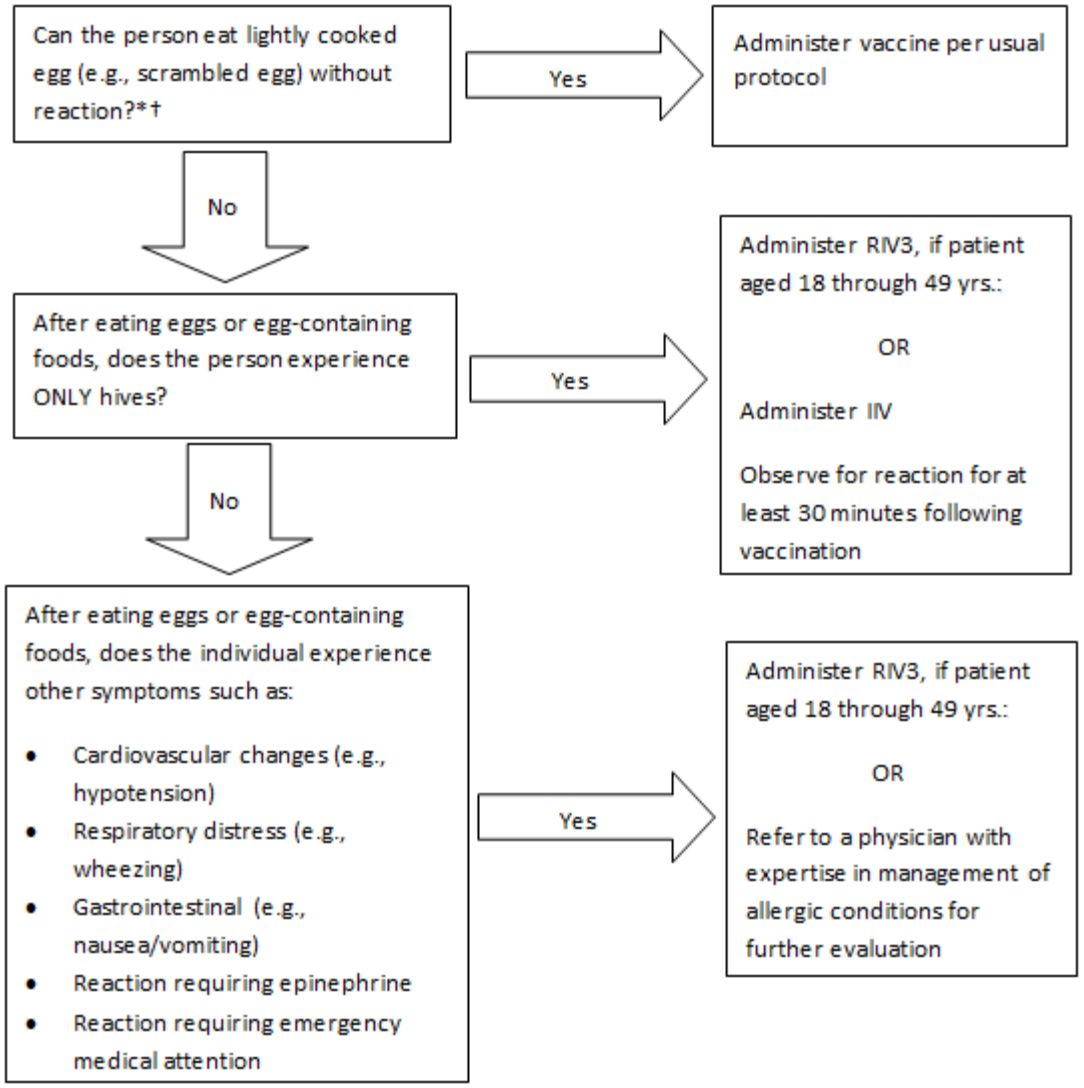
2013-14 ACIP Recommendations

- **Influenza Vaccination of Persons with a History of Egg Allergy**
  - Persons who report having had reactions to egg involving such symptoms as angioedema, respiratory distress, lightheadedness, or recurrent emesis; or who required epinephrine or another emergency medical intervention may receive RIV3, if aged 18 through 49 years and there are no other contraindications. If RIV3 is not available or the the recipient is not within the indicated age range, such persons should be referred to a physician with expertise in the management of allergic conditions for further risk assessment before receipt of vaccine .
  - All vaccines should be administered in settings in which personnel and equipment for rapid recognition and treatment of anaphylaxis are available.
  - Some persons who report allergy to egg might not be egg-allergic. Those who are able to eat lightly cooked egg (e.g., scrambled egg) without reaction are unlikely to be allergic. Egg-allergic persons might tolerate egg in baked products (e.g., bread or cake). Tolerance to egg-containing foods does not exclude the possibility of egg allergy (2). Egg allergy can be confirmed by a consistent medical history of adverse reactions to eggs and egg-containing foods, plus skin and/or blood testing for immunoglobulin E antibodies to egg proteins.

2013-14 ACIP Recommendations

- **Influenza Vaccination of Persons with a History of Egg Allergy**
  - For individuals who have no known history of exposure to egg, but who are suspected of being egg-allergic on the basis of previously performed allergy testing, consultation with a physician with expertise in the management of allergic conditions should be obtained prior to vaccination. Alternatively, RIV3 may be administered if the recipient is aged 18 through 49 years.
  - A previous severe allergic reaction to influenza vaccine, regardless of the component suspected to be responsible for the reaction, is a contraindication to future receipt of the vaccine.

Recommendations regarding influenza vaccination of persons who report allergy to eggs.



2013-14 ACIP Recommendations

- **Influenza Vaccines and Use of Influenza Antiviral Medications**
  - Administration of IIV to persons receiving influenza antiviral drugs for treatment or chemoprophylaxis is acceptable.
  - LAIV should not be administered until 48 hours after cessation of influenza antiviral therapy.
  - If influenza antiviral medications are administered within 2 weeks after receipt of LAIV, the vaccine dose should be repeated 48 or more hours after the last dose of antiviral medication.
  - Persons receiving antiviral drugs within the period 2 days before to 14 days after vaccination with LAIV should be revaccinated at a later date with any approved vaccine formulation

2013-14 ACIP Recommendations

- **Concurrent Administration of Influenza Vaccine With Other Vaccines**
  - Inactivated vaccines do not interfere with the immune response to other inactivated vaccines or to live vaccines.
  - Inactivated or live vaccines can be administered simultaneously with LAIV.
  - However, after administration of a live vaccine, at least 4 weeks should pass before another live vaccine is administered.

TABLE 2. Contraindications and Precautions to the Use of Influenza Vaccines, 2013-14.*

Vaccine	Contraindications	Precautions
IIV (includes IIV3, II4, and ccIIV)	History of severe allergic reaction to any component of the vaccine, including egg protein, or after previous dose of any influenza vaccine.	Moderate to severe 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 illness with or without fever. History of Guillain-Barré syndrome within 6 weeks of receipt of influenza vaccine.
LAIV	History of severe allergic reaction to any component of the vaccine, including egg protein, gentamicin, gelatin, and arginine, or after a previous dose of any influenza vaccine; Concomitant Aspirin therapy in children and adolescents. In addition, ACIP recommends against use in the following: • Children aged 2--4 years whose parents or caregivers report that a health-care provider (HCP) has told them during the preceding 12 months that their child had wheezing or asthma or whose medical record indicates a wheezing episode has occurred during the preceding 12 months (see screening guidance, footnote in Table 1); • Persons with asthma; • Children and adults who have chronic pulmonary, cardiovascular (except isolated hypertension), renal, hepatic, neurologic/neuromuscular, hematologic, or metabolic disorders; • Children and adults who have immunosuppression (including immunosuppression caused by medications or by HIV); • Persons with egg allergy; • Close contacts and caregivers of severely immunosuppressed persons who require a protected environment; • Pregnant women	Moderate to severe illness with or without fever. History of Guillain-Barré syndrome within 6 weeks of receipt of influenza vaccine.

IIV=Inactivated Influenza Vaccine; IIV3=Inactivated Influenza Vaccine, Trivalent; IIV4=Inactivated Influenza Vaccine, Quadrivalent; RIV=Recombinant Influenza Vaccine LAIV=Live-Attenuated Influenza Vaccine; IM=intramuscular; ID=intradermal; IN=intranasal.

* Immunization providers should check Food and Drug Administration--approved prescribing information for 2013--14 influenza vaccines for the most complete and updated information, including (but not limited to) indications, contraindications, and precautions. Immunization providers should check Food and Drug Administration--approved prescribing information for 2013--14 influenza vaccines for the most updated, manufacturer-specific information, including (but not limited to) indications, contraindications, and precautions.

Package inserts for US-licensed vaccines are available at http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm093833.htm.

2013-14 Influenza Vaccine Options

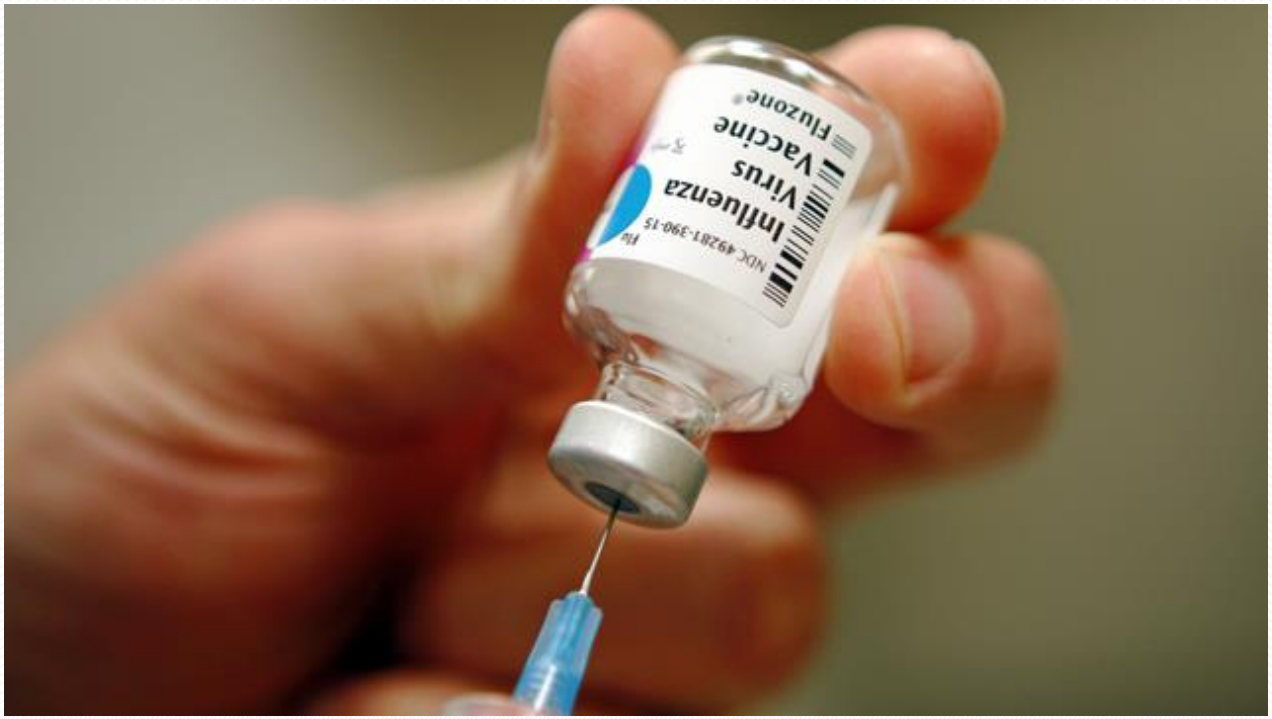


TABLE 1. Influenza Vaccines — United States, 2013–14 Influenza Season*

Vaccine	Trade name	Manufacturer	Presentation	Mercury content (µg Hg/0.5 mL)	Ovalbulmin content (µg/0.5 mL)	Age indications	Route
Inactivated Influenza Vaccine, Trivalent (IIV3), Standard Dose	Afluria®	CSL Limited	0.5 mL single-dose prefilled syringe	0.0	≤ 1	≥9 yrs.†††	IM†
			5.0 mL multi-dose vial	24.5	≤ 1		
	Fluarix®	GlaxoSmithKline	0.5 mL single-dose prefilled syringe	0.0	≤0.05	≥3 yrs.	IM†
	Flucelvax®	Novartis Vaccines	0.5 mL single-dose prefilled syringe	0.0	§§§	≥18 yrs.	IM†
	FluLaval®	ID Biomedical Corporation of Quebec (distributed by GlaxoSmithKline)	5.0 mL multi-dose vial	<25.0	≤0.3	≥3 yrs	IM†
	Fluvirin®	Novartis Vaccines	0.5 mL single-dose prefilled syringe	≤1	≤1	≥4 yrs.	IM†
			5.0 mL multi-dose vial	25.0	≤1		
	Fluzone®	Sanofi Pasteur	0.25 mL single-dose prefilled syringe	0.0	****	6-35 mos.	IM†
			0.5 mL single-dose prefilled syringe	0.0	****	≥36 mos.	IM†
			0.5 mL single-dose vial	0.0	****	≥36 mos.	IM†
			5.0 mL multi-dose vial	25.0	****	≥6 mos.	IM†
	Fluzone® Intradermal††	Sanofi Pasteur	0.1 mL prefilled microinjection system	0.0	****	18-64 yrs.	ID§
Inactivated Influenza Vaccine, Trivalent (IIV3), High Dose**	Fluzone® High-Dose	Sanofi Pasteur	0.5 mL single-dose prefilled syringe	0.0	****	≥65 yrs.	IM†

TABLE 1. Influenza Vaccines — United States, 2013–14 Influenza Season*

Vaccine	Trade name	Manufacturer	Presentation	Mercury content (µg Hg/0.5 mL)	Ovalbulmin content (µg/0.5 mL)	Age indications	Route	
Inactivated Influenza Vaccine, Quadrivalet (IIV4), Standard Dose	Fluarix® Quadrivalent	GlaxoSmithKline	0.5 mL single-dose prefilled syringe	0.0	≤0.05	≥3 yrs.	IM†	
	FluLaval® Quadrivalent	ID Biomedical Corporation of Quebec (distributed by GlaxoSmithKline)	5.0 mL multi-dose vial	<25.0	≤0.03	≥3 yrs.	IM†	
	Fluzone® Quadrivalent	Sanofi Pasteur	0.25 mL single-dose prefilled syringe	0.0	****	6-35 mos.	IM†	
			0.5 mL single-dose prefilled syringe	0.0	****	≥36 mos.	IM†	
			0.5 mL single-dose vial	0.0	****	≥36 mos.	IM†	
Recombinant Influenza Vaccine, Trivalent (RIV3)	FluBlok®	Protein Sciences	0.5 mL single-dose vial	0.0	0.0	18-49 yrs.	IM†	
Live-attenuated Influenza Vaccine, Quadrivalent (LAIV4)	FluMist® Quadrivalent§§	MedImmune	0.2 mL prefilled intranasal sprayer	0.0 (per 0.2 mL)	<0.24 (per 0.2 mL)	2-49 yrs.***	IN	

2013-14 Influenza Vaccine Options

- Trivalent inactivated vaccine (IIV3)
  - The regular trivalent inactivated vaccine that given intramuscularly is approved for people 6 months of age and older, including healthy people, those with chronic medical conditions, and pregnant women.
  - A "high dose" trivalent inactivated vaccine also given intramuscularly containing 4 times the amount of antigen as the regular TIV that is approved for use in people 65 and older. It was introduced in 2009-2010.
  - An intradermal trivalent inactivated vaccine that is given into the dermal layer of the skin via a single-dose, prefilled microinjection syringe and that contains less antigen than the intramuscular TIV formulations. The intradermal vaccine was approved for use in people 18 through 64 years of age in 2011.

2013-14 Influenza Vaccine Options

- Inactivated influenza vaccine quadrivalent (IIV4)
  - New for this season
  - Will include an additional vaccine virus, a B/Brisbane/60/2008-like virus
  - Also IM injection
  - Several brands with different age indications (refer to product information carefully)

2013-14 Influenza Vaccine Options

- Live, Attenuated Intranasal Influenza Vaccine (LAIV4)
  - given as a nasal spray
  - 2013-14 is quadrivalent (will include an additional vaccine virus, a B/Brisbane/60/2008-like virus)
  - healthy people 2-49 years of age
    - contraindications
      - Asthma
      - Pregnancy

2013-14 Influenza Vaccine Options

- RIV3 refers to recombinant hemagglutinin influenza vaccine
  - Available as a trivalent formulation (RIV3) for 2013-14
  - IM injection
  - Approved in ages 18-49 years
  - May use in egg allergic patients

2013-14 Influenza Vaccine Options

- **Cell-based flu vaccine**
  - In place of fertilized chicken eggs, the cell-based vaccine manufacturing process for Flucelvax uses animal cells (Madin-Darby Canine Kidney, or MDCK) in liquid culture as a host for the growing influenza virus.
  - An alternative to the egg-based manufacturing process. Cell culture technology is potentially more flexible than the traditional technology, which relies upon adequate supply of eggs.
  - A major advantage of cell culture technology includes the potential for a faster start-up of the vaccine manufacturing process in the event of a pandemic. The cells used to manufacture Flucelvax are kept frozen and "banked." Cell banking assures an adequate supply of cells is readily available for vaccine production. Growing the influenza viruses in cell culture for the manufacture of Flucelvax is not dependent on an egg supply.

Summary

- Influenza continues to cause significant morbidity and mortality in the US
- Children are an important factor in the spread of influenza disease
- Influenza vaccination is the key strategy to decrease the impact of influenza infection in the US
- 2013-14 ACIP recommendations continue to encourage influenza vaccination for a vast majority
  - Please keep guidelines available for easy reference
- Many new influenza vaccine options are available for 2013-14
  - Follow age and patient-specific recommendations closely


Thank
You

Influenza A (H7N9)

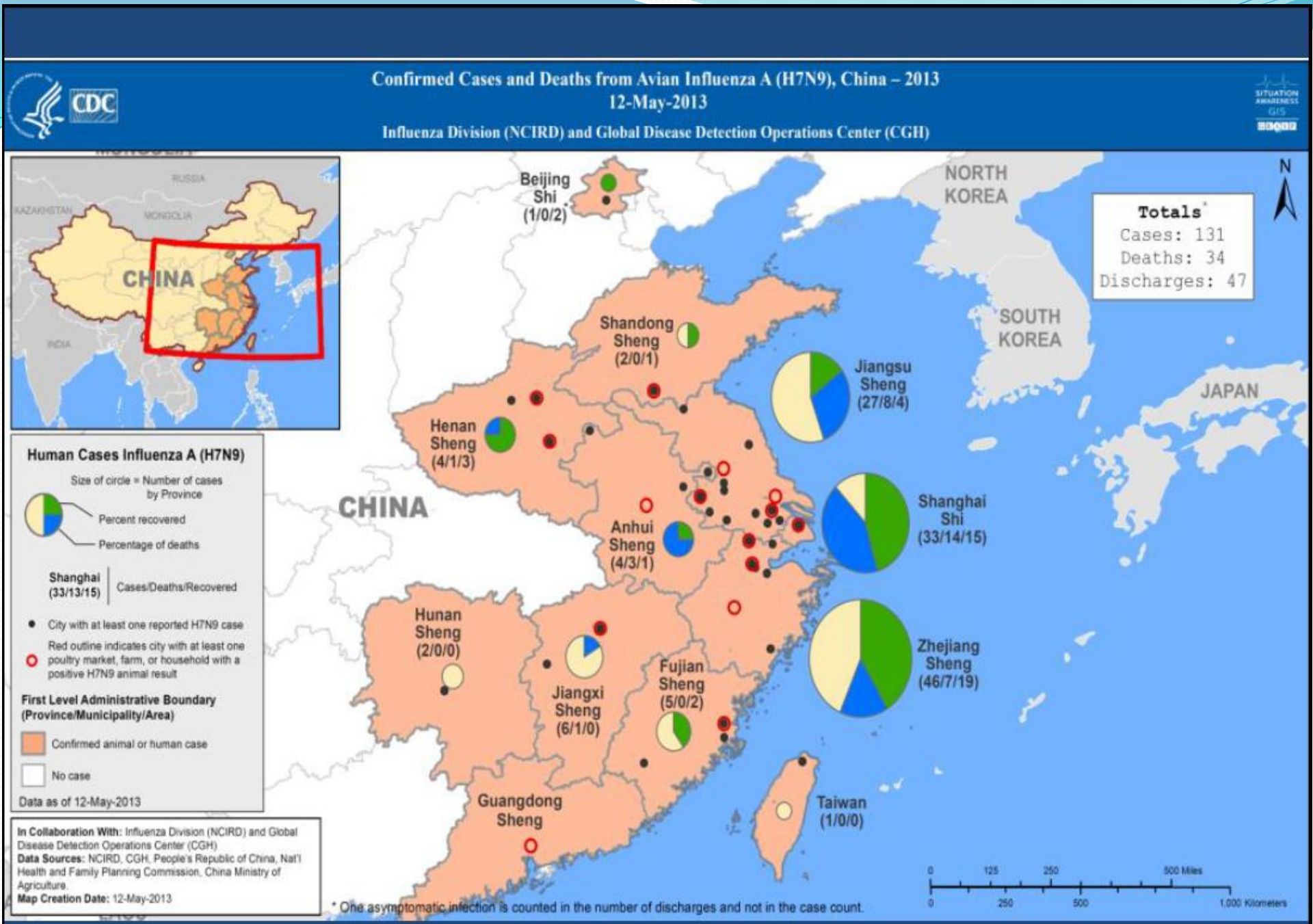
Influenza A (H7N9) in China

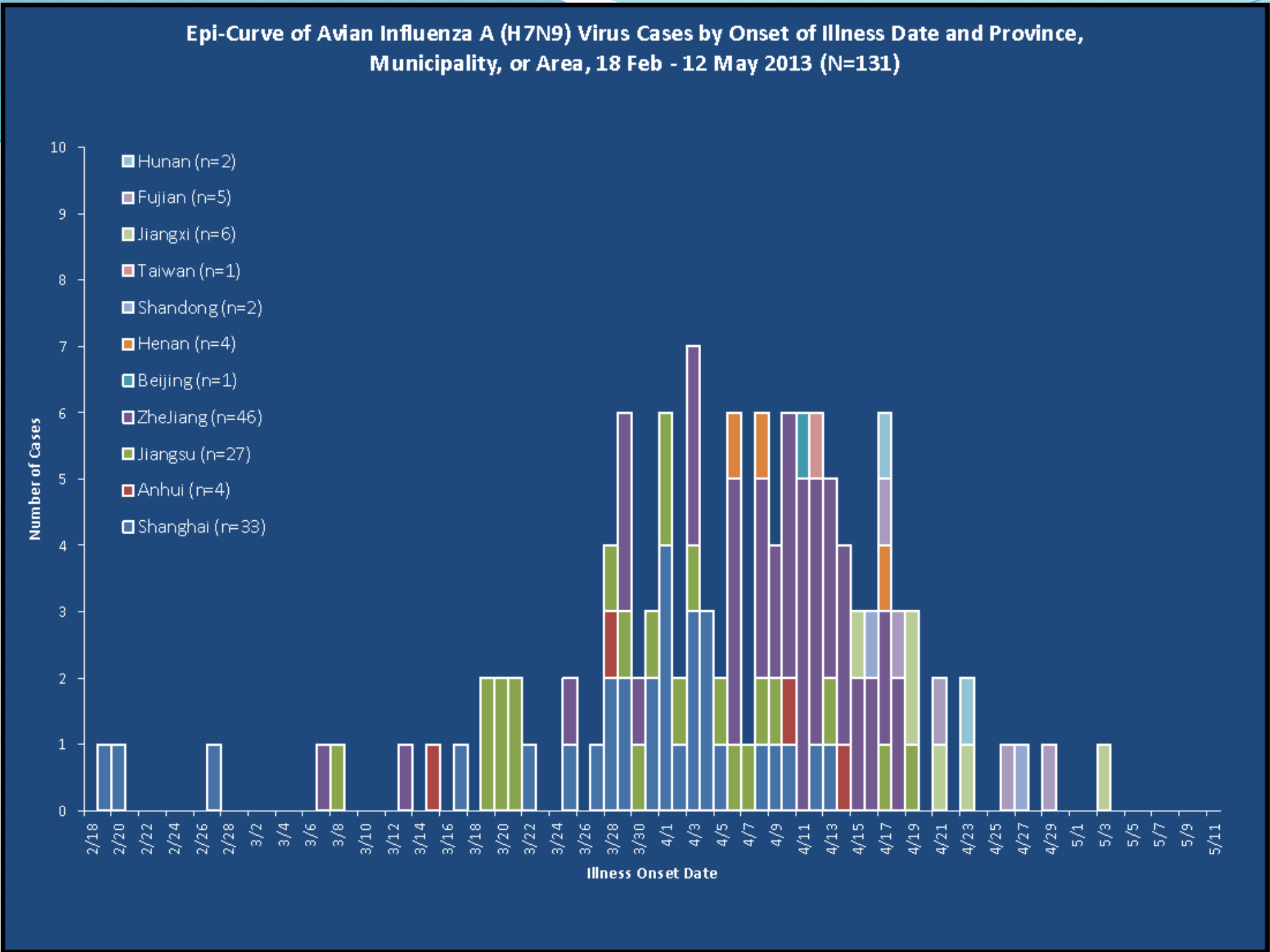
- First 3 cases were reported by China on March 31
- Virus is different from other H7 viruses that have infected humans
- Better adapted for infecting mammals than H5N1 but not fully adapted
- Poultry believed to be the source of human infections
- Low pathogenicity in poultry

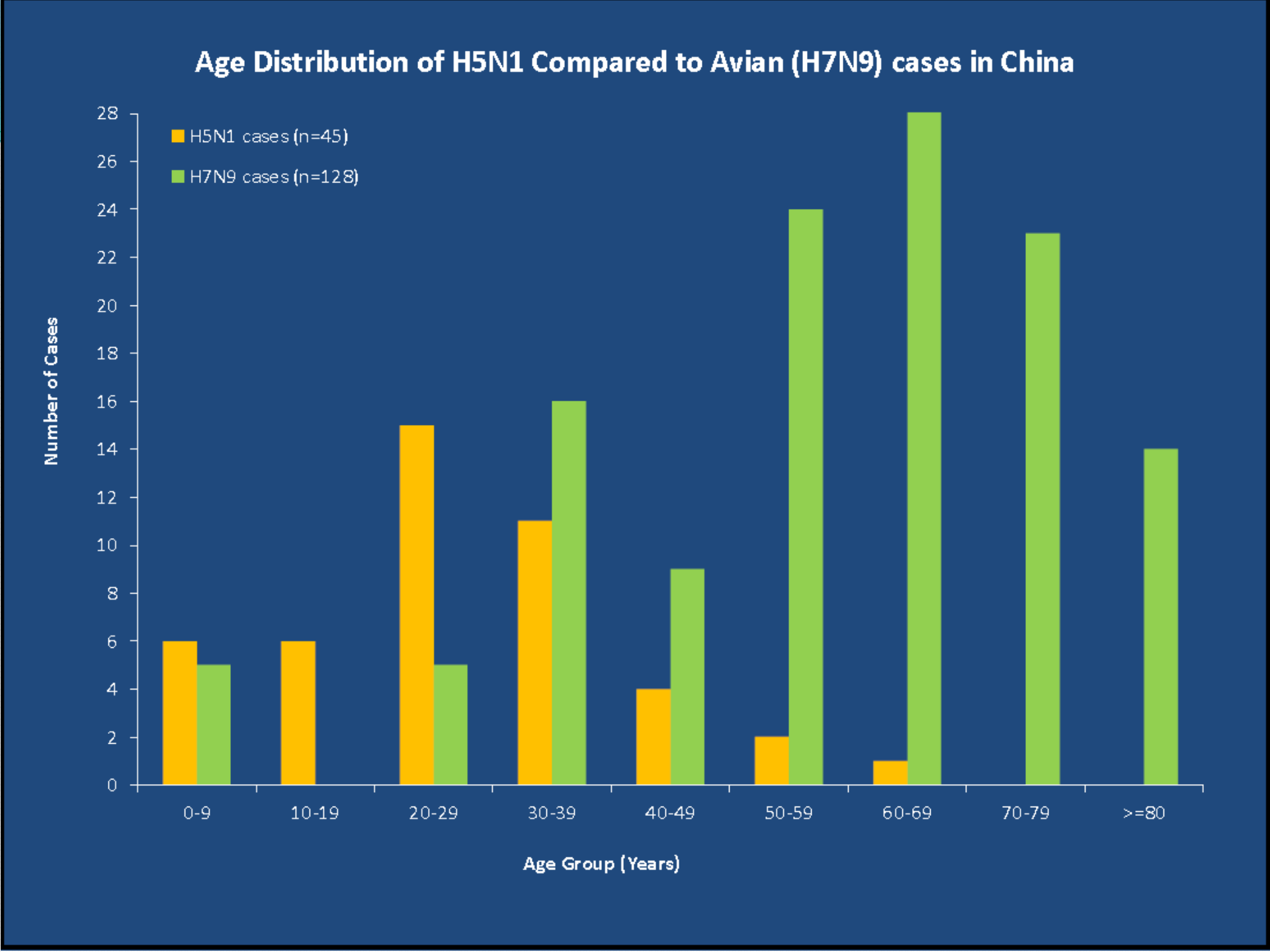
Influenza A (H7N9) Summary — China

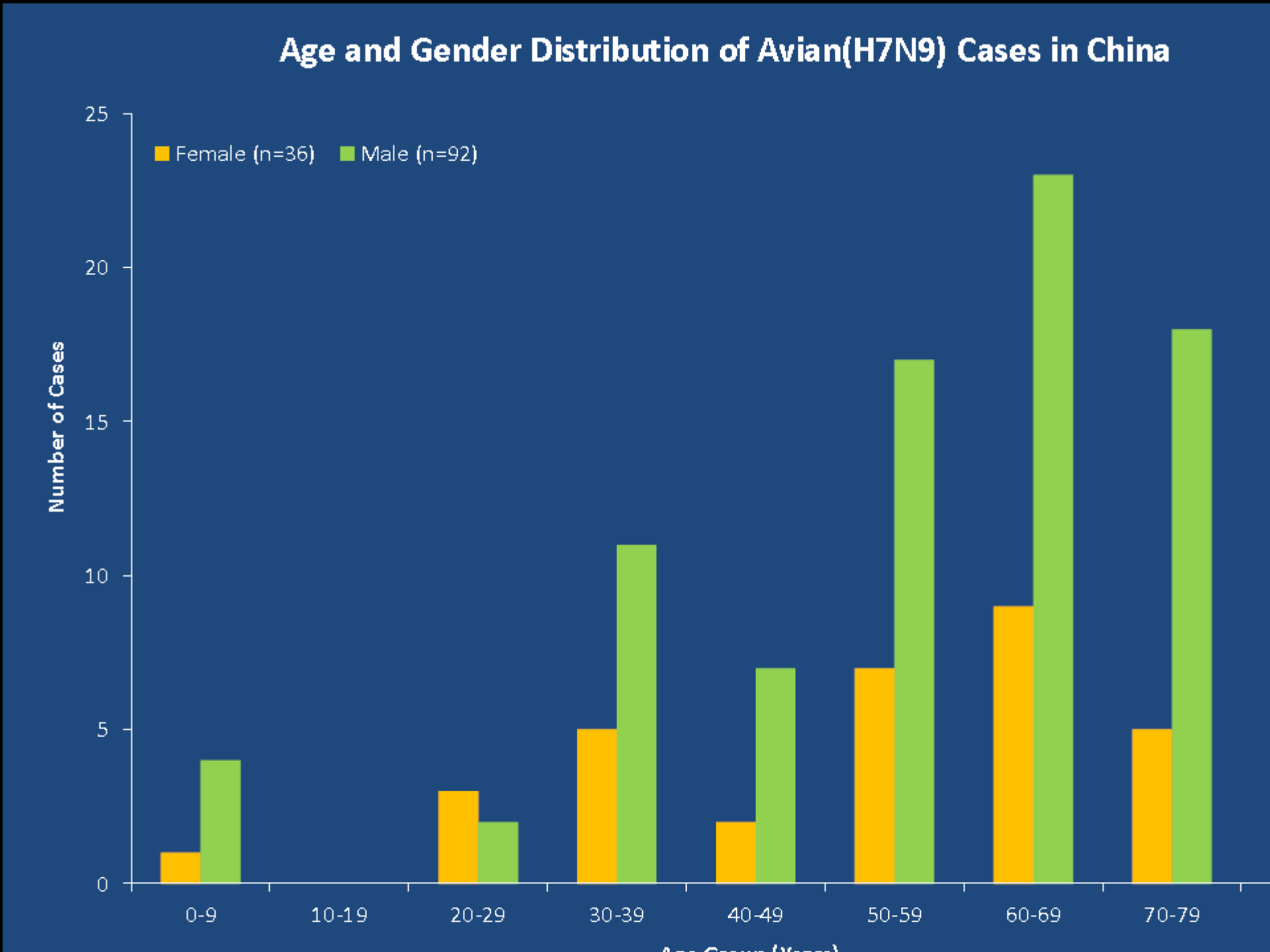
Cumulative counts since 19 Feb 2013	N
Number of provinces/municipalities/areas with confirmed cases	8 / 2 / 1
Number of confirmed cases*	131
Number of fatal confirmed cases	35

* Confirmed cases include persons with laboratory confirmation of H7N9 infection through report from China CDC or Provincial CDC


Confirmed Cases and Deaths from Avian Influenza A (H7N9), China – 2013
12-May-2013
Influenza Division (NCIRD) and Global Disease Detection Operations Center (CGH)
CDC
RUSSIA
KAZAKHSTAN
MONGOLIA
CHINA
INDIA
Beijing Shi (1/0/2)*
NORTH KOREA
SOUTH KOREA
JAPAN
Totals*
Cases: 131
Deaths: 34
Discharges: 47
N
Shandong Sheng (2/0/1)
Jiangsu Sheng (27/8/4)
Henan Sheng (4/1/3)
Anhui Sheng (4/3/1)
Shanghai Shi (33/14/15)
Hunan Sheng (2/0/0)
Jiangxi Sheng (6/1/0)
Fujian Sheng (5/0/2)
Zhejiang Sheng (46/7/19)
Guangdong Sheng
Taiwan (1/0/0)
Human Cases Influenza A (H7N9)
Size of circle = Number of cases by Province
Percent recovered
Percentage of deaths
Shanghai (33/13/15)
Cases/Deaths/Recovered
City with at least one reported H7N9 case
Red outline indicates city with at least one poultry market, farm, or household with a positive H7N9 animal result
First Level Administrative Boundary (Province/Municipality/Area)
Confirmed animal or human case
No case
Data as of 12-May-2013
In Collaboration With: Influenza Division (NCIRD) and Global Disease Detection Operations Center (CGH)
Data Sources: NCIRD, CGH, People's Republic of China, Nat'l Health and Family Planning Commission, China Ministry of Agriculture.
Map Creation Date: 12-May-2013
* One asymptomatic infection is counted in the number of discharges and not in the case count.
0 125 250 500 Miles
0 250 500 1,000 Kilometers


Epi-Curve of Avian Influenza A (H7N9) Virus Cases by Onset of Illness Date and Province, Municipality, or Area, 18 Feb - 12 May 2013 (N=131)
Hunan (n=2)
Fujian (n=5)
Jiangxi (n=6)
Taiwan (n=1)
Shandong (n=2)
Henan (n=4)
Beijing (n=1)
ZheJiang (n=46)
Jiangsu (n=27)
Anhui (n=4)
Shanghai (n=33)
Number of Cases
0
1
2
3
4
5
6
7
8
9
10
2/18
2/20
2/22
2/24
2/26
2/28
3/2
3/4
3/6
3/8
3/10
3/12
3/14
3/16
3/18
3/20
3/22
3/24
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
4/13
4/15
4/17
4/19
4/21
4/23
4/25
4/27
4/29
5/1
5/3
5/5
5/7
5/9
5/11
Illness Onset Date


Age Distribution of H5N1 Compared to Avian (H7N9) cases in China
H5N1 cases (n=45)
H7N9 cases (n=128)
Number of Cases
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
>=80
Age Group (Years)


Age and Gender Distribution of Avian(H7N9) Cases in China
Female (n=36)
Male (n=92)
Number of Cases
25
20
15
10
5
0
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79

Domestic Surveillance for H7N9

- Reagents for detection of H7 viruses are available for public health laboratories
- >50 ill returning travelers from China have been tested
- –No unusual viruses identified