



# 2010-2011 Influenza Update

Kenneth “Mac” McCall, BSP Pharm, PharmD



College of Pharmacy

# Outline

- Influenza Virus Population Data
- Vaccination Rates
- 2010-11 Influenza Vaccines
- Live Attenuated Influenza Vaccine (LAIV)
- High-Dose Trivalent Inactivated Vaccine (HD TIV)

# Influenza Virus

- Influenza A virus
  - Infect birds and some mammals including humans
  - Antigenic drift and occasionally shift
  - Categorized according to hemagglutinin and neuraminidase
  - 16 different H antigens and 9 different N antigens
- Influenza B virus
  - Only known to infect humans
  - Antigenic drift, but not shift
- Influenza C virus
  - Infects humans and pigs
  - Rare compared to A & B



Seasonal influenza  
vaccine contains  
2 type-A and 1 type-B

## Number of Deaths in the U.S. for Leading Causes Final Data for 2005\*

- Heart disease: 652,091
- Cancer: 559,312
- Stroke (cerebrovascular diseases): 143,579
- Chronic lower respiratory diseases: 130,933
- Accidents (unintentional injuries): 117,809
- Diabetes: 75,119
- Alzheimer's disease: 71,599
- **Influenza/Pneumonia: 63,001**
- Nephritis, nephrotic syndrome, and nephrosis: 43,901
- Septicemia: 34,136

\*Source: [Deaths: Final Data for 2005, Tables C, 7, 30](http://www.cdc.gov/nchs/FASTATS/deaths.htm) PDF  
Available at <http://www.cdc.gov/nchs/FASTATS/deaths.htm>

## Number of Deaths in Maine for Leading Causes Final Data for 2007\*

- Cancer: 3,112
- Heart Disease: 2,852
- Chronic lower respiratory diseases: 728
- Stroke (cerebrovascular diseases): 664
- Accidents (unintentional injuries): 584
- Alzheimer's disease: 470
- Diabetes: 355
- **Influenza/Pneumonia: 352**
- Nephritis, nephrotic syndrome, and nephrosis: 269
- Intentional Self harm (suicide) 191

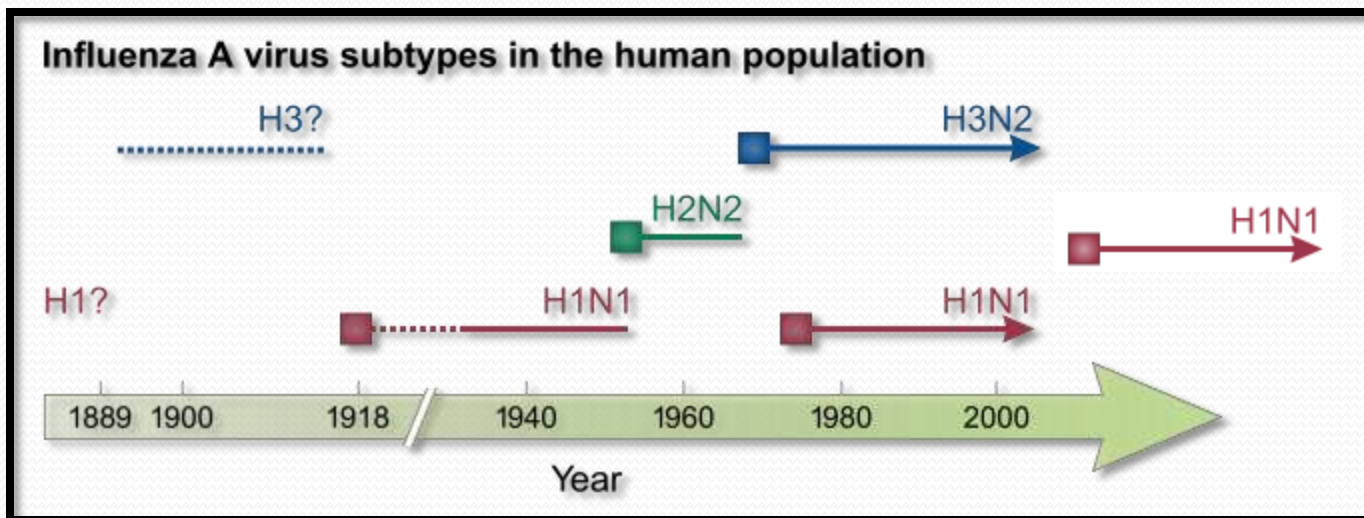


Copyright 2008 digital map images.com

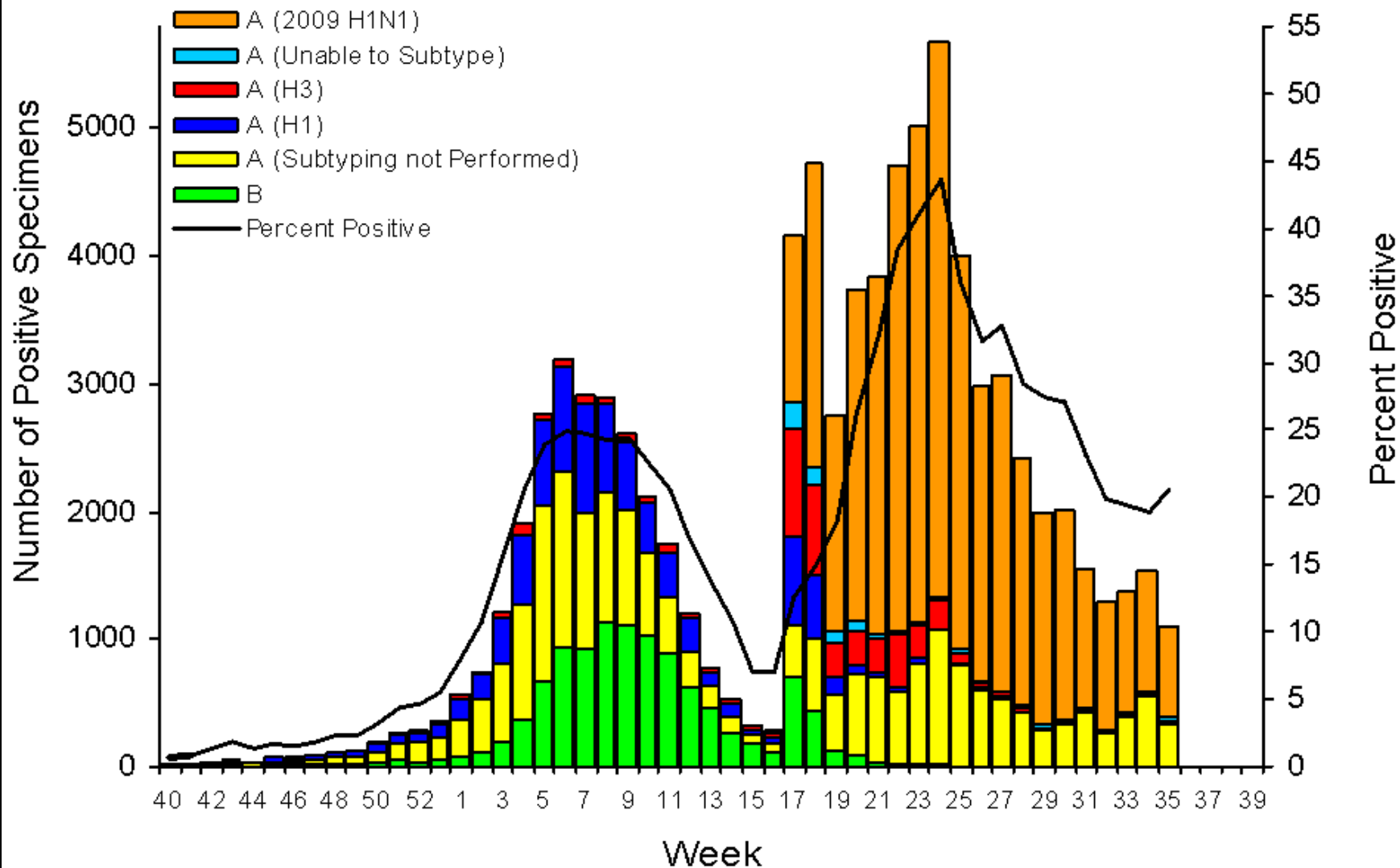
\***Source:** Deaths, percent of total deaths, and death rates for the 15 leading causes of death: United States and each State, 2007 **PDF**  
[http://www.cdc.gov/nchs/datawh/statab/unpubd/mortabs/lcwk9\\_10.htm](http://www.cdc.gov/nchs/datawh/statab/unpubd/mortabs/lcwk9_10.htm)

# Influenza Virus A Subtype H1N1

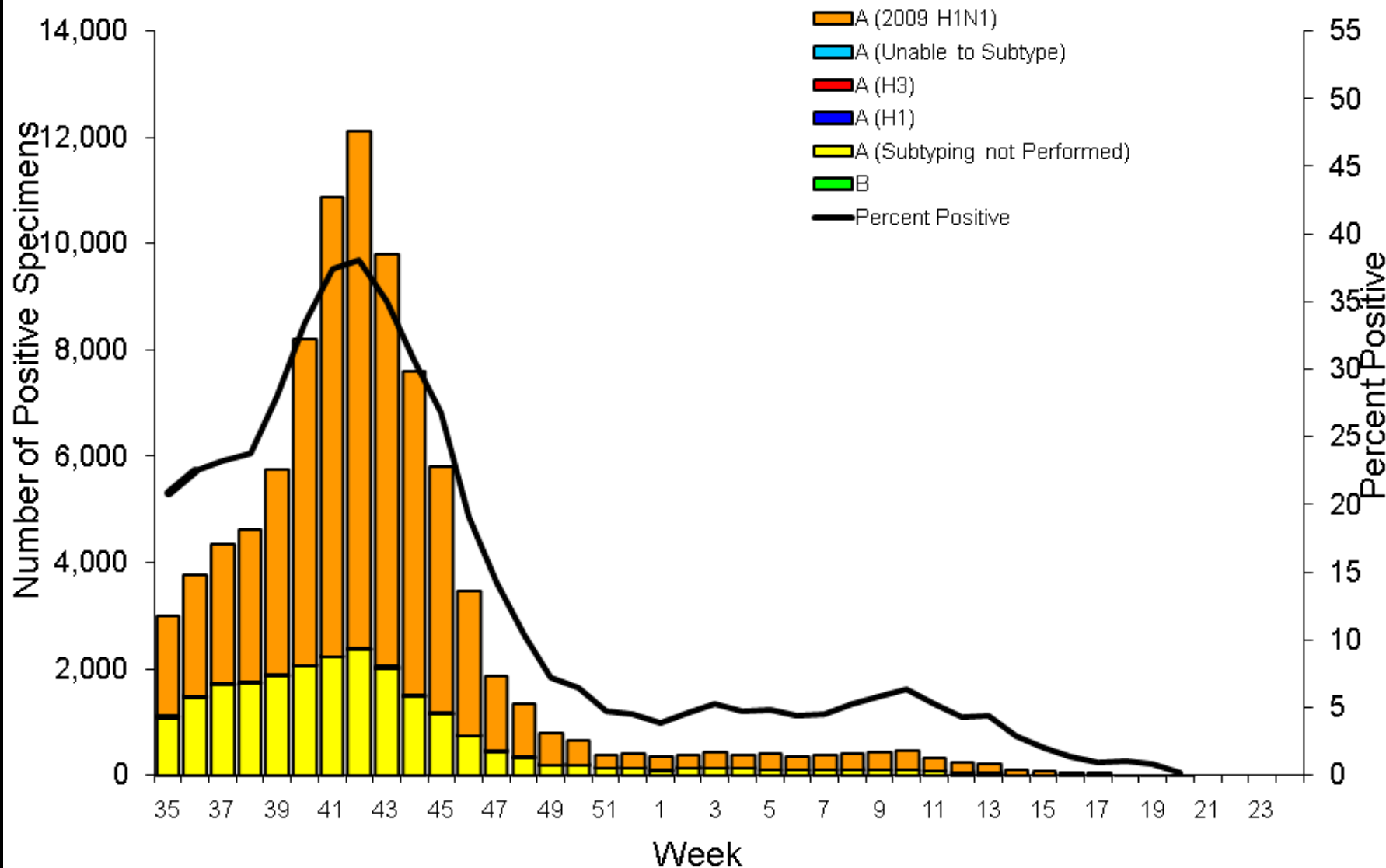
- Most common cause of influenza in humans
- H<sub>1</sub>N<sub>1</sub> strains caused roughly half of all human flu infections in 2006
- Novel H<sub>1</sub>N<sub>1</sub> outbreaks
  - 1918 “Spanish” flu, 1977 “Russian” flu, 2009 “swine” flu



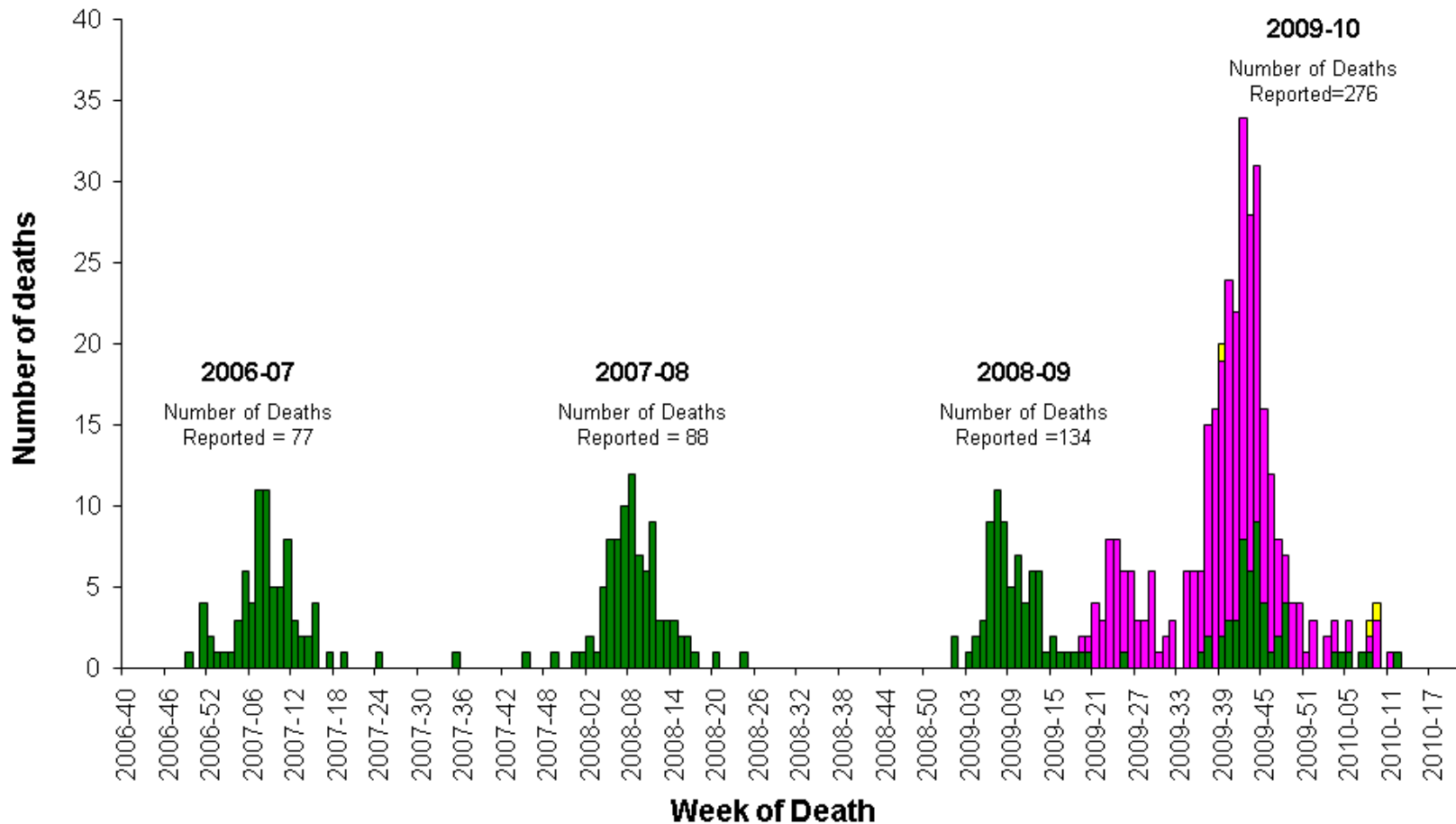
# Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2008-09



# Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2009-10



# Number of Influenza-Associated Pediatric Deaths by Week of Death: 2006-07 season to present



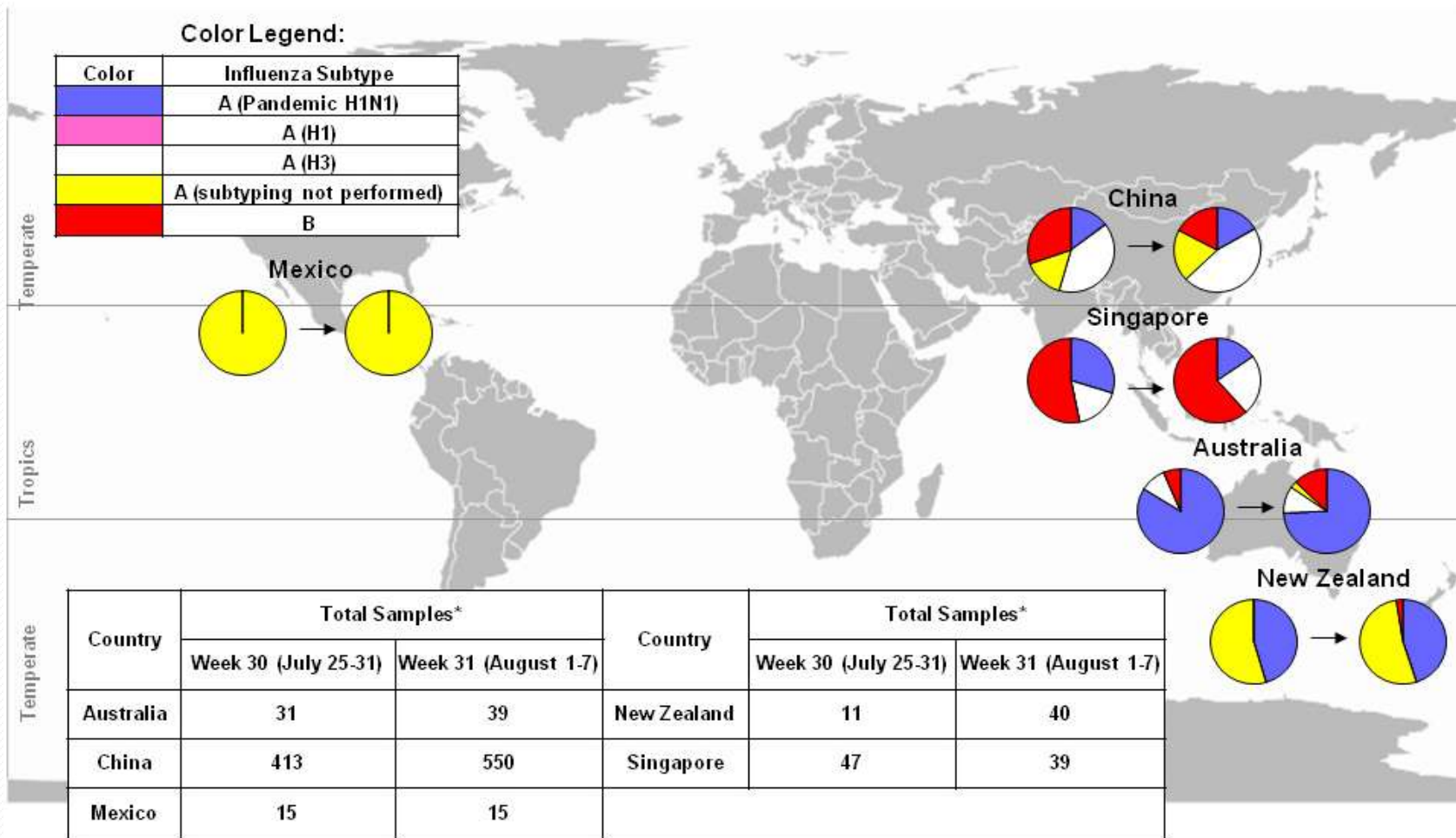
- |  |  |
|--|--|
| 2009 Influenza A (H1N1) Deaths Reported Current Week   | Other Influenza Deaths Reported Current Week   |
| 2009 Influenza A (H1N1) Deaths Reported Previous Weeks | Other Influenza Deaths Reported Previous Weeks |

# International Influenza Data as of August 17, 2010

## Proportion of Influenza Subtypes in Select Countries

Week 30 to 31, 2010

Data Source: FluNet (<http://gamapserver.who.int/GlobalAtlas/home.asp>)



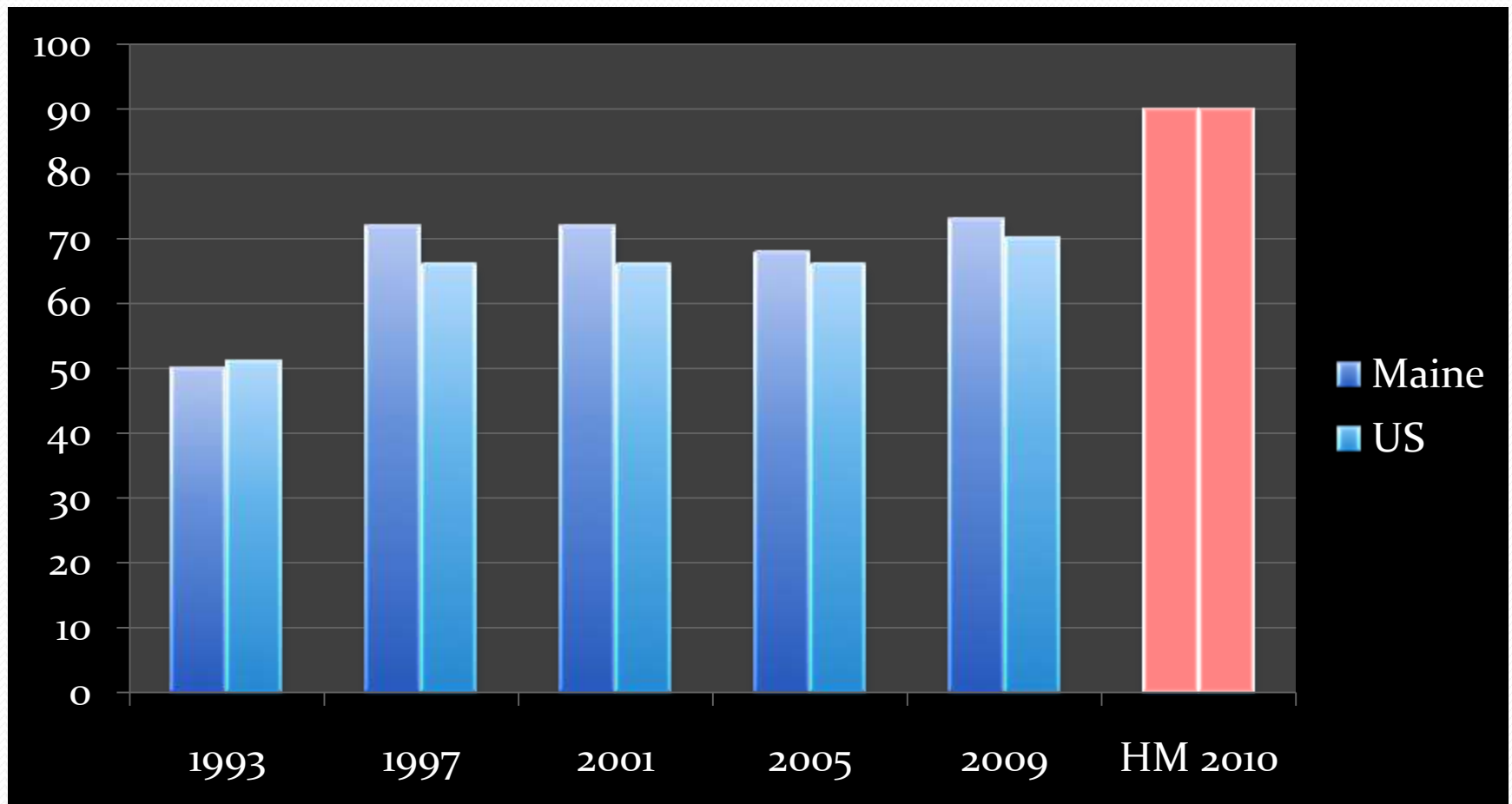
\*Total Samples = Sum of samples positive for A(H1), A(H3), A(Pandemic H1N1), A (subtyping not performed), and B.

# Vaccination Rates

# Did you get your flu shots last year?

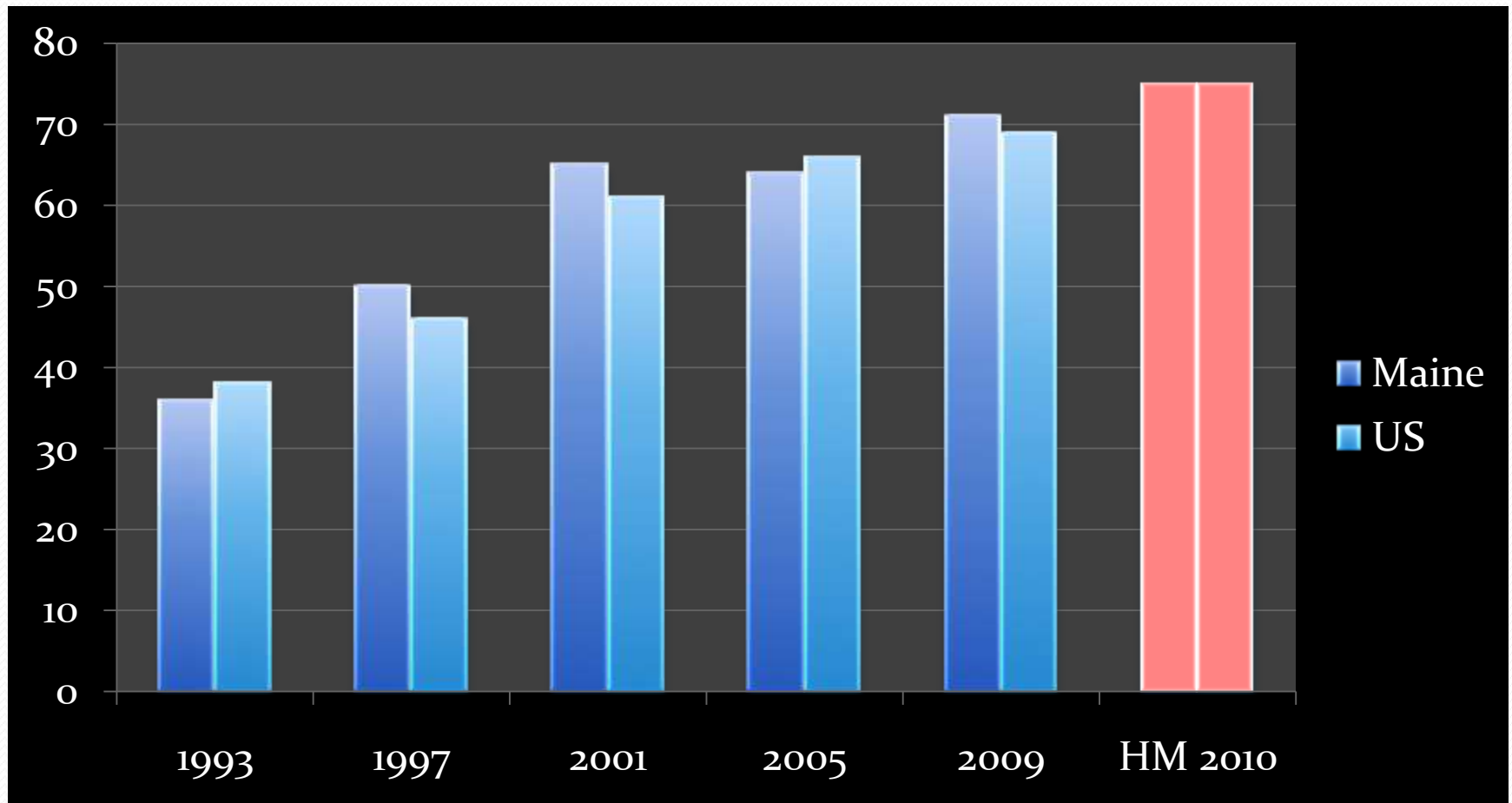
1. H<sub>1</sub>N<sub>1</sub> flu shot only
2. Seasonal flu shot only
3. Both H<sub>1</sub>N<sub>1</sub> and Seasonal flu shots
4. Neither flu shot

# Proportion Of Adults Aged 65 And Older Who Received A Flu Shot Within The Past Year



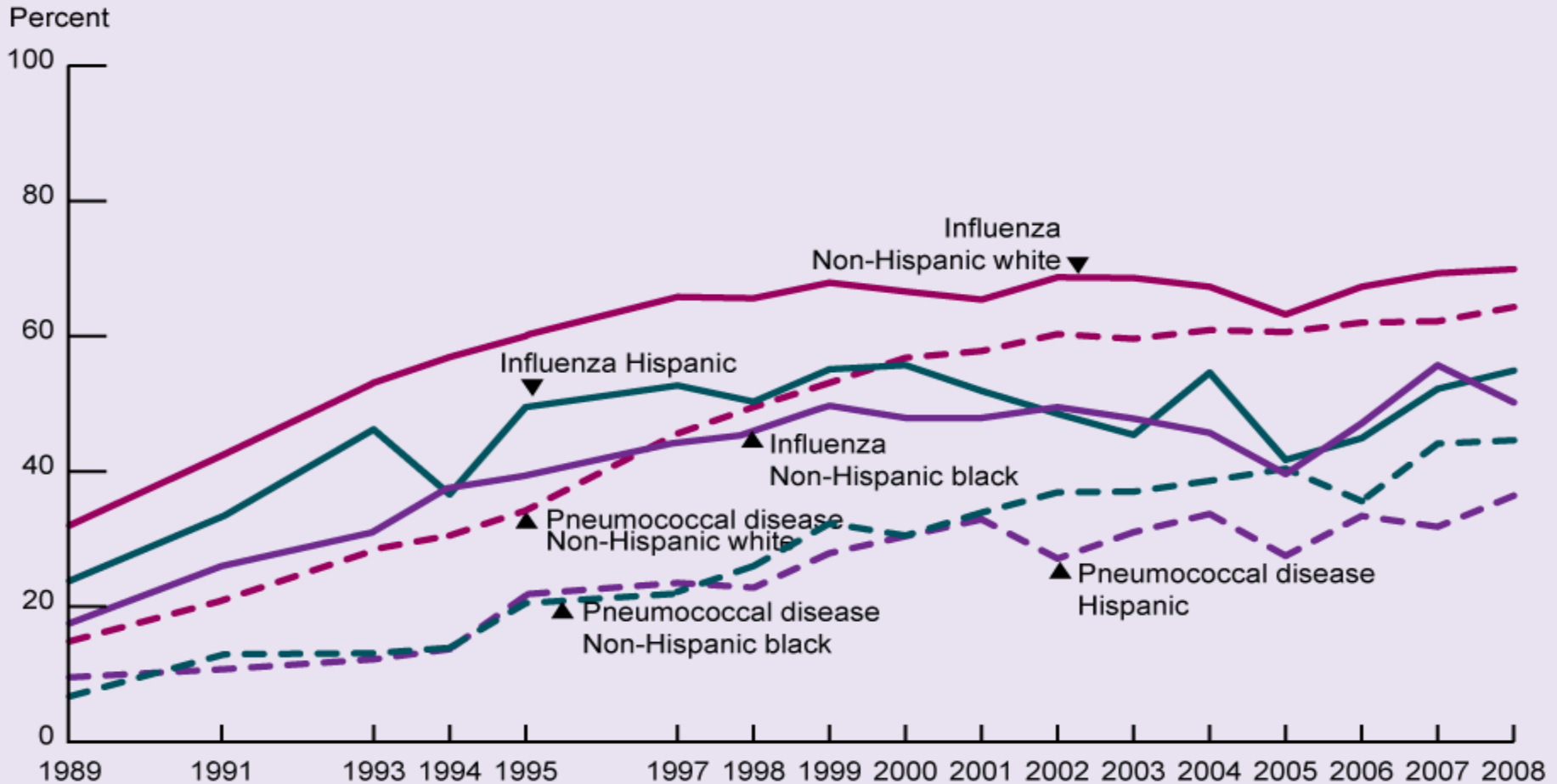
<http://www.cdc.gov/flu/>

# Proportion Of Adults Aged 65 And Older Who Report Ever Having Had A Pneumonia Vaccination



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

## Percentage of population age 65 and over vaccinated against influenza and pneumococcal disease, by race and Hispanic origin, selected years 1989–2008



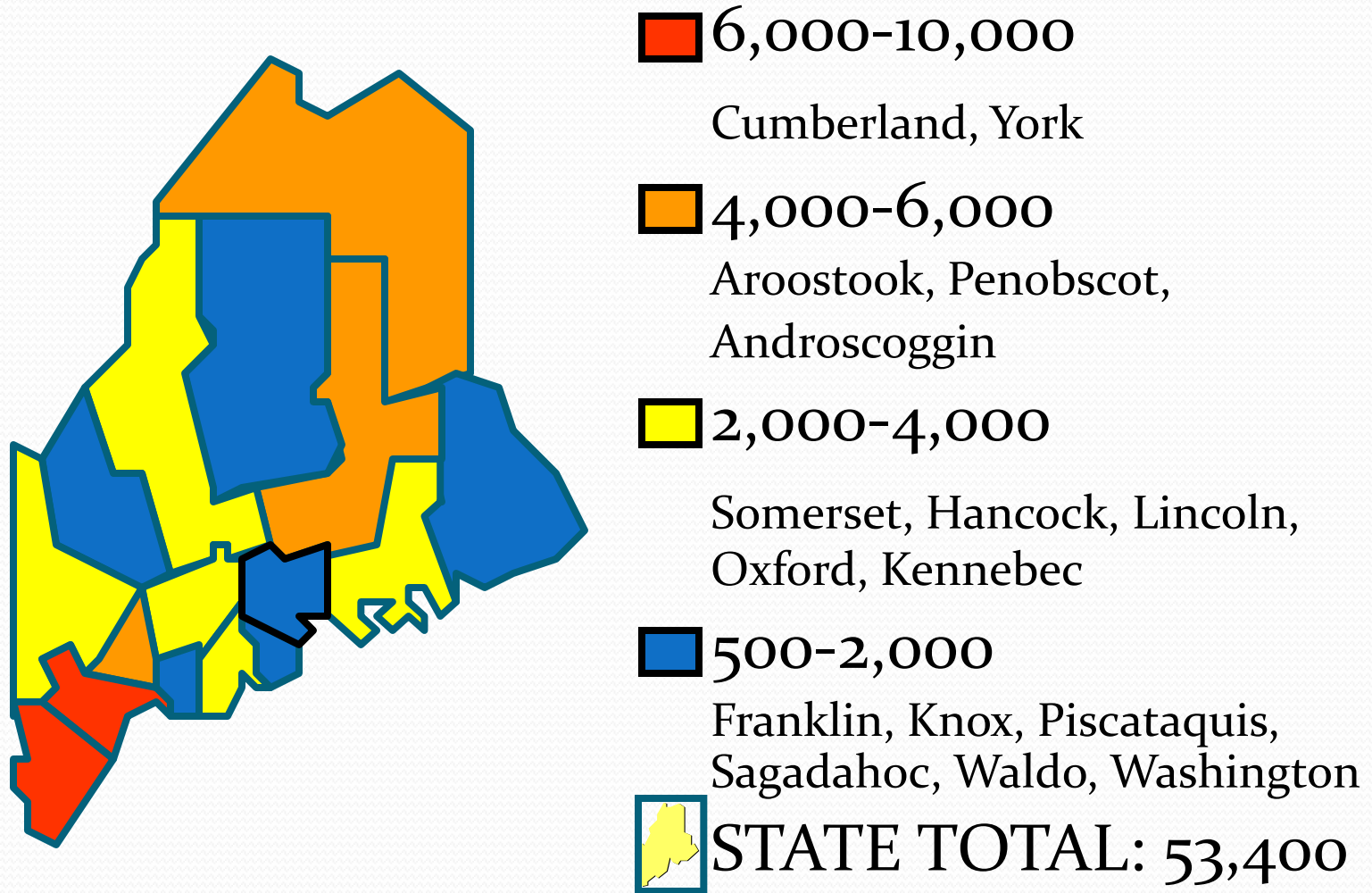
NOTE: For influenza, the percentage vaccinated consists of people who reported having a flu shot during the past 12 months and does not include receipt of nasal spray flu vaccinations. For pneumococcal disease, the percentage refers to people who reported ever having a pneumonia vaccination.

See Appendix B for the definition of race and Hispanic origin in the National Health Interview Survey.

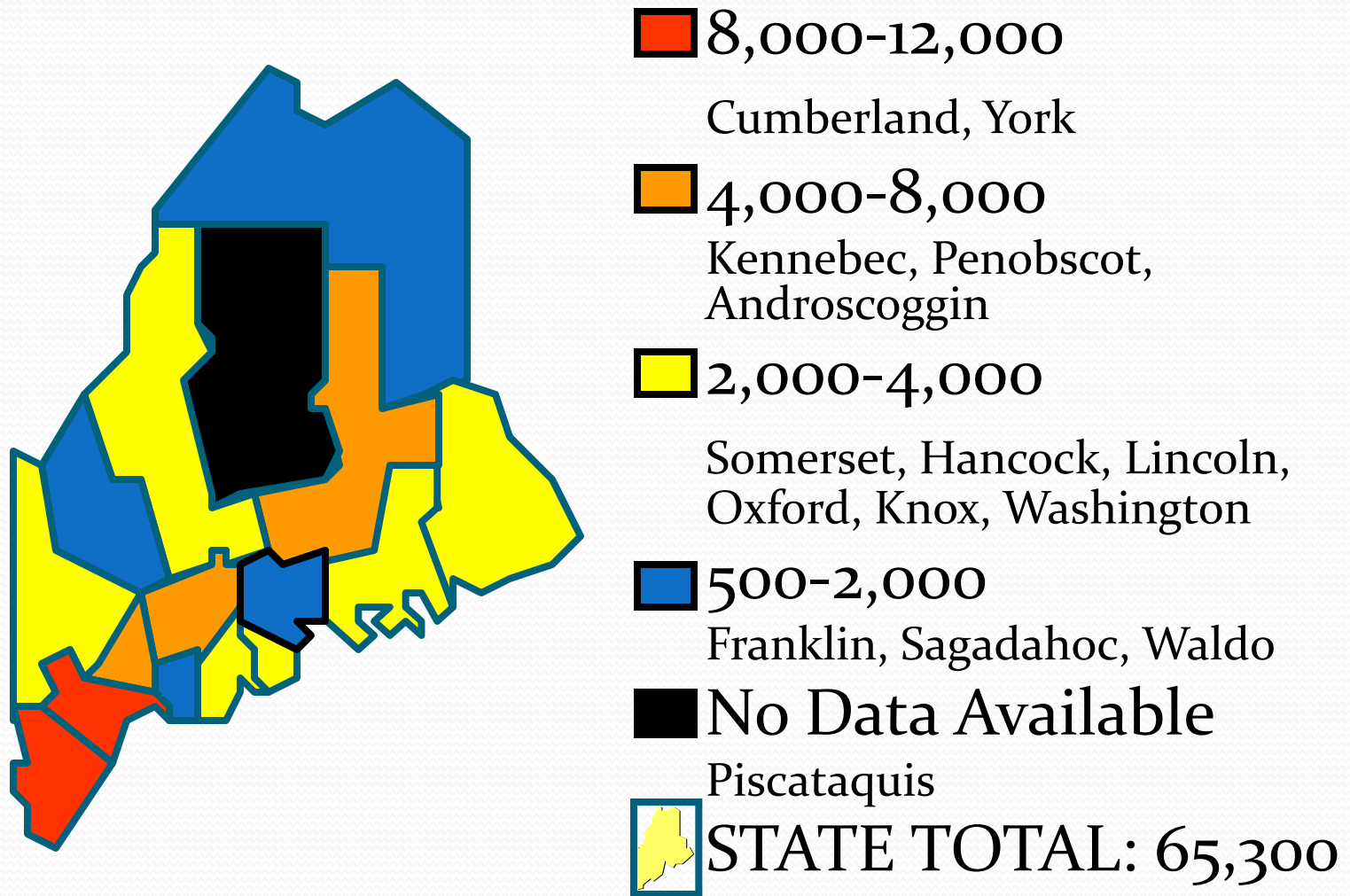
Reference population: These data refer to the civilian noninstitutionalized population.

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey.

# Number of adults age 65+ who did not receive an influenza vaccination within the past year



# Number of adults age 65+ who have never had a pneumonia vaccination



# Promoting Healthier and Longer Lives

- Pharmacists are well positioned in rural and urban communities to boost immunization rates and lower the burden of vaccine-preventable diseases.
- Pharmacists can work interdependently with other stakeholders to collaboratively reach Healthy Maine 2010 goals.

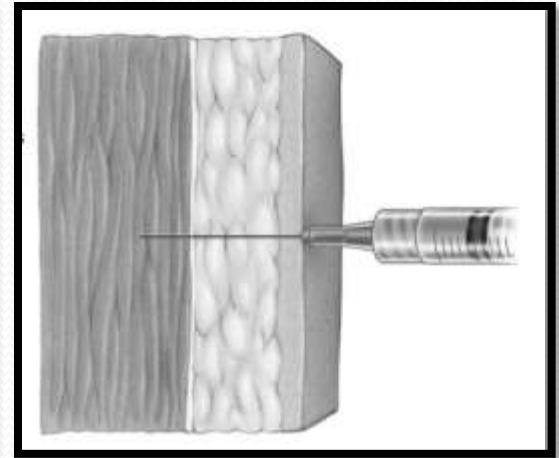
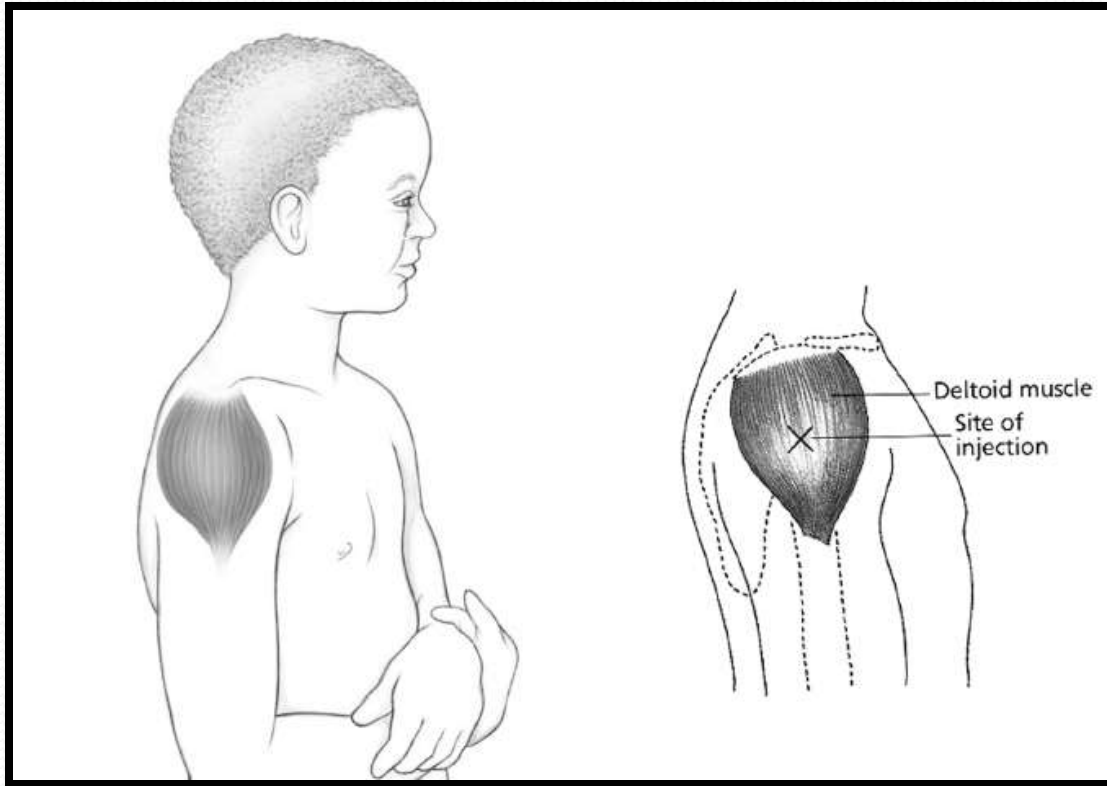
# 2010-11 Influenza Vaccines

# 2010-11 ACIP/CDC/WHO Recommendations

- World Health Organization: the global H1N1 pandemic is over.
- Routine influenza vaccination is recommended for all persons aged  $\geq 6$  months.
- The 2010--11 trivalent vaccines will contain A/California/7/2009 (H1N1)-like, A/Perth/16/2009 (H3N2)-like, and B/Brisbane/60/2008-like antigens.
- Persons aged  $\geq 65$  years can be administered any of the standard-dose TIV preparations or Fluzone High-Dose.
- The CDC also recommends that flu vaccine be administered to eligible recipients every year as soon as the vaccine becomes available.

Vaccine	Trade Name	Manufacturer	Presentation	Mercury (mcg/0.5 ml)	Age Group	No. of doses	Route
TIV	Fluzone	Sanofi Pasteur	0.25 mL syringe	0	6–35 mos	1 or 2	IM
			0.5 mL syringe	0	≥36 mos	1 or 2	IM
			0.5 mL vial	0	≥36 mos	1 or 2	IM
			5.0 mL MD vial	25	≥6 mos	1 or 2	IM
TIV	Fluvirin	Novartis Vaccine	5.0 mL MD vial	25	≥4 yrs	1 or 2	IM
			0.5 mL syringe	<1.0	≥4 yrs	1 or 2	IM
TIV	Agriflu	Novartis Vaccine	0.5 mL syringe	0	≥18 yrs	1	IM
TIV	Fluarix	GlaxoSmith Kline	0.5 mL syringe	0	≥3 yrs	1 or 2	IM
TIV	FluLaval	ID Biomedical	5.0 mL MD vial	25	≥18 yrs	1	IM
TIV	Afluria	CSL Biotherapy	0.5 mL syringe	0	≥9 yrs	1	IM
TIV High Dose	Fluzone High Dose	Sanofi Pasteur	0.5 mL syringe	0	≥65 yrs	1	IM
LAIV	FluMist	Med-Immune	0.2 mL sprayer	0	2–49 yrs	1 or 2	Intra-nasal

# TIV Administration



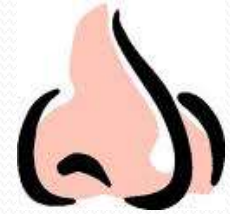
# 2010-11 Influenza Vaccines

Live Attenuated Influenza Vaccine (LAIV)

Flumist

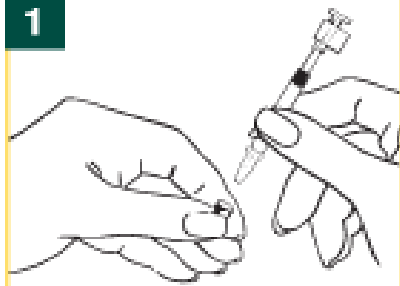
# Live Attenuated Influenza Vaccine

- Indication
  - Healthy people 2 through 49 years of age
- Contraindications
  - **Pregnant women**
  - **People who have long-term health problems with:**
    - heart disease
    - kidney or liver disease
    - lung disease
    - metabolic disease, such as diabetes
    - asthma
    - anemia, and other blood disorders
  - **Anyone with a weakened immune system.**



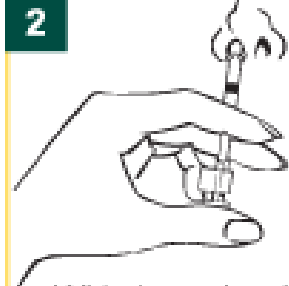
**I pick my nose!**

# LAIV Administration



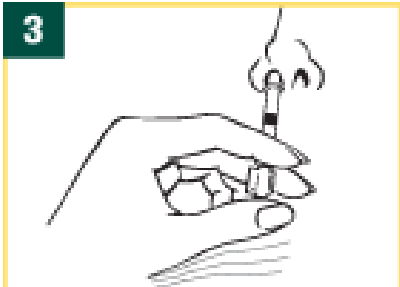
1

Remove rubber tip protector.



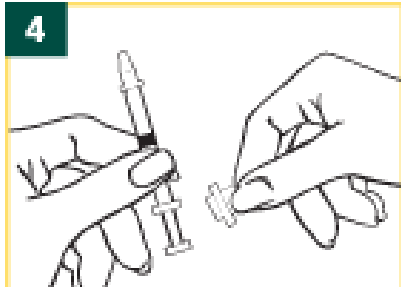
2

With the patient in an upright position, head tilted back, place the tip just inside the nostril to ensure FluMist is delivered into the nose.



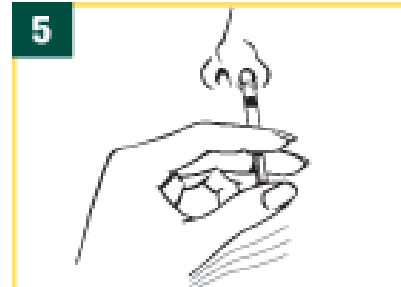
3

With a single motion, depress plunger **as rapidly as possible** until the dose-divider clip prevents you from going further.



4

Pinch and remove dose-divider clip from plunger.



5

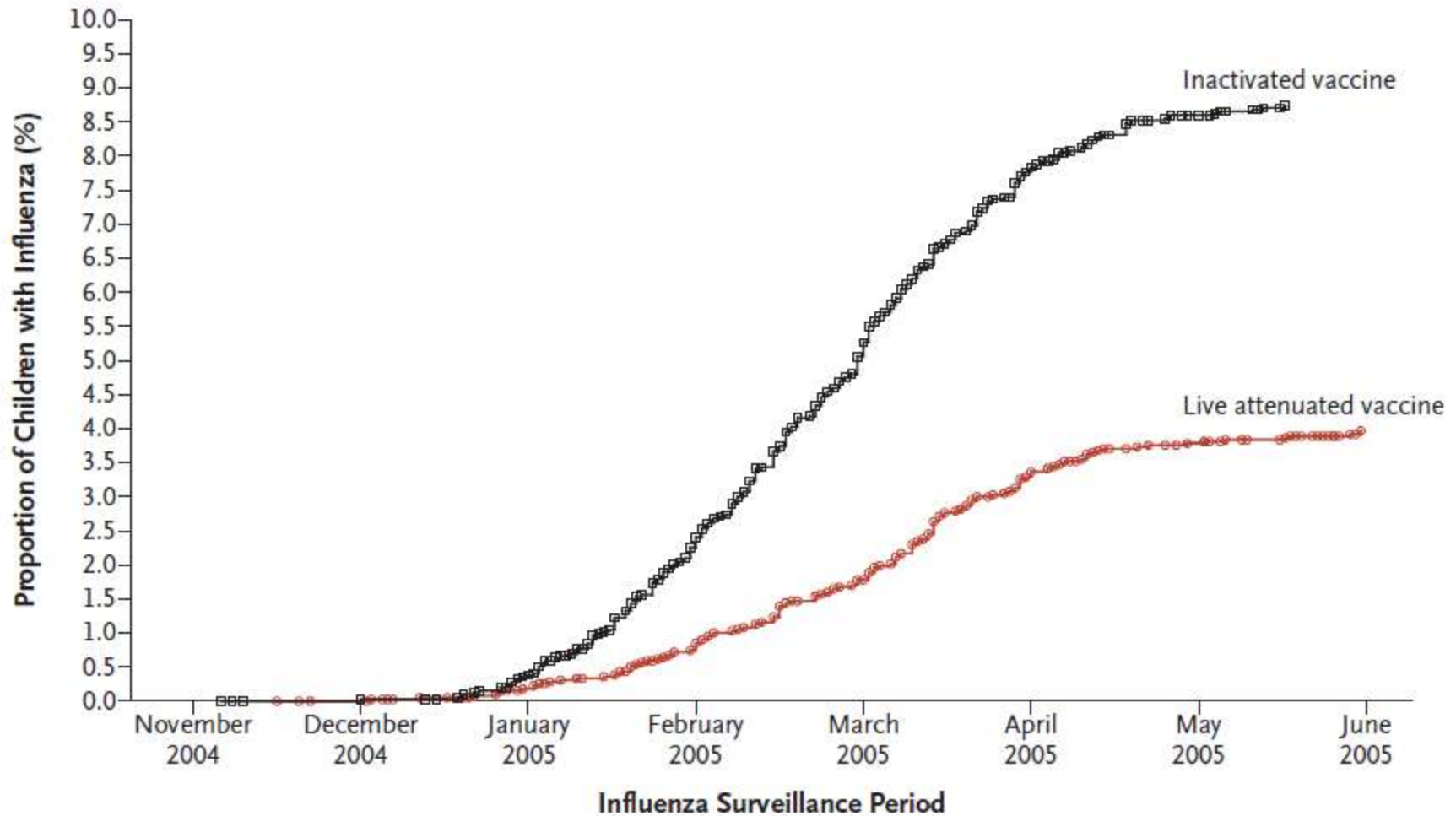
Place the tip just inside the other nostril and with a single motion, depress plunger **as rapidly as possible** to deliver remaining vaccine.

# Live Attenuated versus Inactivated Influenza Vaccine in Infants and Young Children

*N Engl J Med* 2007;356:685-96.

- Children 6 to 59 months of age, without a recent episode of wheezing illness or severe asthma.
- Randomized, double-blind study with either trivalent live attenuated influenza vaccine or trivalent inactivated vaccine.
- 7852 children completed the study and were monitored with culture throughout the 04-05 influenza season.

# Live Attenuated versus Inactivated Influenza Vaccine in Infants and Young Children



**Figure 1.** Kaplan-Meier Curves for the Time to the First Culture-Confirmed Report of Influenza in the Two Vaccine Groups.

# Medically Significant Wheezing, Serious Adverse Events, and Rates of Hospitalization According to Age Group

Age	Event	Live Vaccine	Inactivated Vaccine
		no. / total no. (%)	
6-11 mos.	Wheezing	93/684 (13.6)	71/683 (10.4)
	Any serious AE	44/684 (6.4)	23/683 (3.4)
	Hospitalization	42/684 (6.1)	18/683 (2.6)
12-59 mos.	Wheezing	272/3495 (7.8)	255/3490 (7.3)
	Any serious AE	92/3495 (2.6)	105/3490 (3.0)
	Hospitalization	88/3495 (2.5)	101/3490 (2.9)
6-59 mos.	Wheezing	365/4179 (8.7)	326/4173 (7.8)
	Any serious AE	136/4179 (3.3)	128/4173 (3.1)
	Hospitalization	130/4179 (3.1)	119/4173 (2.9)

# 2010-11 Influenza Vaccines

High-Dose Trivalent Inactivated Vaccine (HD TIV)

Fluzone HD

# Randomized, Double-Blind Controlled Phase 3 Trial Comparing the Immunogenicity of High-Dose and Standard-Dose Influenza Vaccine in Adults 65 Years of Age and Older

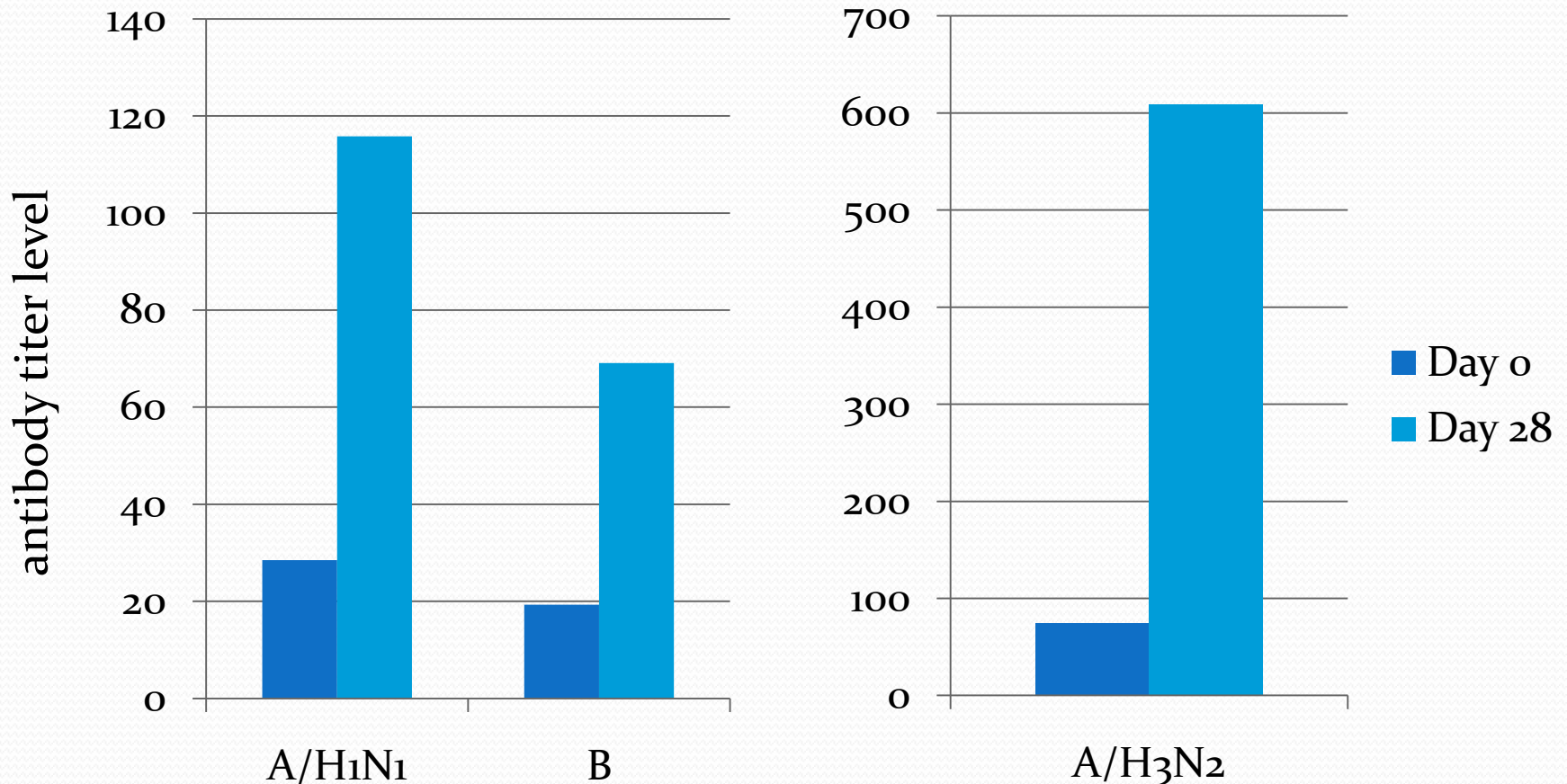
**Ann R. Falsey,<sup>1,2</sup> John J. Treanor,<sup>2</sup> Nadia Tornieporth,<sup>3</sup> Jose Capellan,<sup>5</sup> and Geoffrey J. Gorse<sup>4</sup>**

<sup>1</sup>Department of Medicine, Rochester General Hospital and <sup>2</sup>University of Rochester School of Medicine, Rochester, New York; <sup>3</sup>sanofi pasteur, Swiftwater, Pennsylvania; <sup>4</sup>Saint Louis Department of Veterans Affairs Medical Center and Saint Louis University, Saint Louis, Missouri; <sup>5</sup>sanofi pasteur, Toronto, Canada

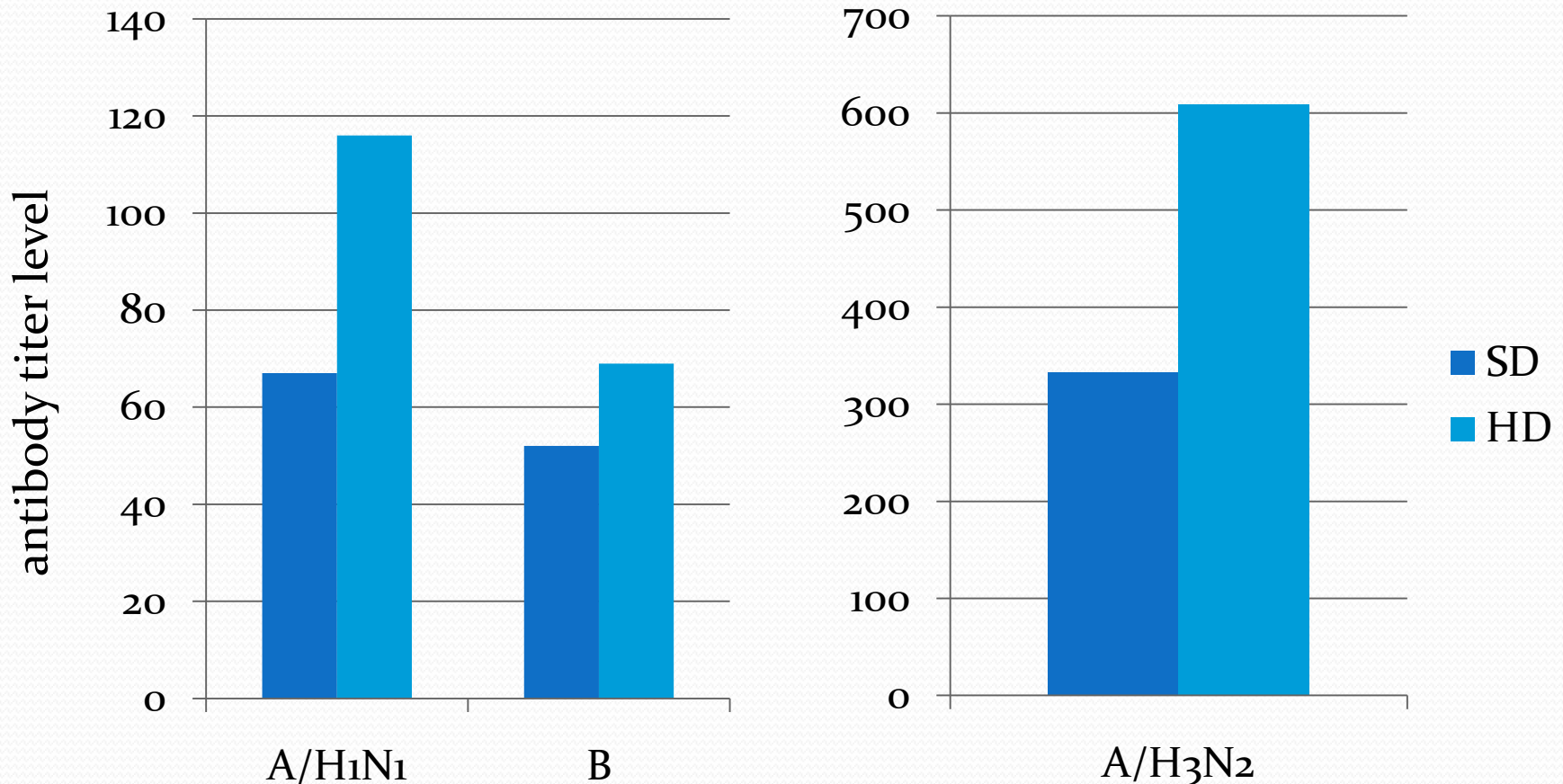
- **Methods:**

- Multicenter, randomized, double-blind controlled study
- HD vaccine (which contains 60 mg of hemagglutinin per strain)
- SD vaccine (which contains 15 mg of hemagglutinin per strain)
- in adults 65 years of age and older.

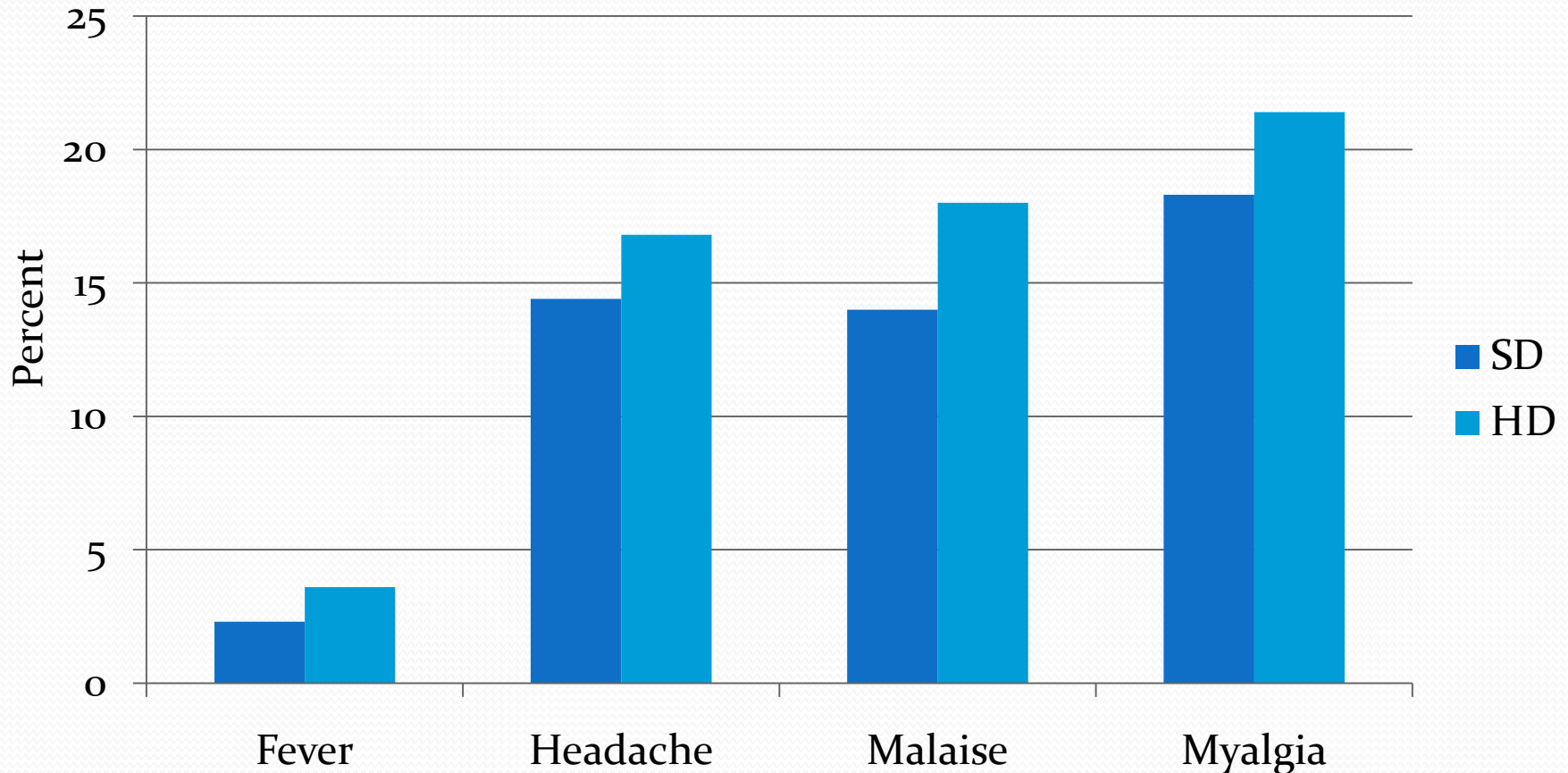
# Titer Response of High-Dose Vaccine



# Comparison of responses to high-dose (HD) and standard-dose (SD) influenza vaccine



# Comparison of systemic side effects to HD and SD influenza vaccine



J Infect Dis. 2009;200(2):172-80

55 year-old woman with diabetes and asthma on glucophage 1 gm BID, Advair 250/50 1 inhalation BID, and albuterol MDI 2 puffs prn.

Which flu vaccine(s) is/are indicated for her?

1. No influenza vaccine indicated
2. SD TIV 0.5 ml IM only
3. SD TIV or HD TIV 0.5 ml IM
4. SD TIV 0.5 ml IM or LAIV 0.2 ml nasal

36 year-old man whose wife is pregnant. His medical history includes seasonal allergies for which he takes cetirizine 10 mg QD.

Which flu vaccine(s) is/are indicated for him?

1. No influenza vaccine indicated
2. SD TIV 0.5 ml IM only
3. SD TIV or HD TIV 0.5 ml IM
4. SD TIV 0.5 ml IM or LAIV 0.2 ml nasal

69 year-old man with a history of hypertension and a heart attack. His current medications include atenolol 100 mg QD, aspirin 81 mg QD, lisinopril 20 mg QD, NTG SL 0.4 mg prn, and Lipitor 20 mg QD.

**Which flu vaccine(s) is/are indicated for him?**

1. No influenza vaccine indicated
2. SD TIV 0.5 ml IM only
3. SD TIV or HD TIV 0.5 ml IM
4. SD TIV 0.5 ml IM or LAIV 0.2 ml nasal

A mother of an 18 month-old boy wants a flu vaccine for him that is mercury free. The child has no allergies or medical history.

**Which flu vaccine do you recommend?**

1. Fluzone multi-dose vial
2. Fluzone syringe
3. Fluzone HD syringe
4. Flumist nasal spray

# Questions???



<http://www.offthemark.com/>

CDC Influenza Website

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

Flu in Maine: Maine Department of Health and Human Services

<http://www.maine.gov/dhhs/boh/maineflu/>