

If You Have

**Diabetes**

A

**Flu Shot**

Could Save

**Your**

**Life**

**Key Facts:**  
**Influenza & Diabetes**  
**in Adults and Children**

# Key Facts

- **Diabetes in the United States:**
  - Diabetes is the fifth deadliest disease in the United States.<sup>1</sup>
  - Nearly 21 million Americans (7 % prevalence), one-third undiagnosed, have diabetes.<sup>1</sup>
  - If trends continue, more than one-third of Americans born in 2000 will go on to develop diabetes.<sup>1</sup>
  - While type 2 diabetes is on the rise in children, type 1 remains one of the most common chronic diseases in childhood.<sup>2</sup>
  - Approximately one in every 400-600 children and adolescents has type 1 diabetes.

<sup>1</sup> Available at: <http://www.diabetes.org/diabetesstatistics/dangerous-toll.jsp>

<sup>2</sup> Available at: <http://www.diabetes.org/diabetes-statistics/prevalence.jsp>

# Key Facts

- According to ADA, total prevalence by race/ethnicity:
  - **Non-Hispanic Blacks:** Roughly 13 percent of those aged 20 years or older have diabetes (3.2 million total).
  - **Hispanic and Latino Americans:** According to available data, approximately 9.5 percent of this population aged 20 years or older has diabetes (an estimated 2.5 million).
  - **American Indians and Alaska Natives:** 15 percent aged 20 years or older have diabetes (118,000 people).
  - **Asian Americans and Pacific Islanders:** According to available data, certain groups within this population (20 years of age and older) are approximately 1.5-2 times more likely to have diabetes compared to non-Hispanic Whites.
  - **Non-Hispanic Whites:** About 13 million of all non-Hispanic whites aged 20 years or older have diabetes (more than 8 percent of the population).

# Key Facts

## ■ Impact of Influenza in People with Diabetes

- People with diabetes may have impaired immune function, leading to increased morbidity and mortality from influenza infection.<sup>3</sup>
- Influenza can interfere with blood glucose management, putting those with diabetes at increased risk of high or low blood sugar, and those with type 1 diabetes, in particular, are at increased risk of diabetic coma.<sup>4</sup>
- Influenza can exacerbate underlying diabetes and other chronic conditions.
- Many health care professionals come in contact with persons with diabetes, and all can play a role in preventing influenza.

## ■ Importance of Annual Influenza Vaccination

- Influenza vaccination is safe and effective in adults and children with diabetes.<sup>3</sup>

<sup>3</sup> ADA. Position Statement: Influenza and pneumococcal immunization in diabetes. *Diab Care* 2004;27(Suppl 1):S111-S112.

<sup>4</sup> Available at: <http://www.diabetes.org/diabetes-myths.jsp>

# Key Facts

- **As of February 2007, CDC, ADA and other leading medical groups recommend**
  - All children and adults with diabetes (aged six months and older) receive an annual influenza vaccination.<sup>3,5</sup> Despite these longstanding recommendations, immunization rates remain alarmingly low.<sup>6,7</sup>
  - In persons with diabetes aged 18 to 49 years: 40 percent vaccination rate.
  - In persons with diabetes aged 50 to 64 years: 50 percent vaccination rate.
  - Estimates show more than ten million Americans with diabetes go unprotected against influenza each year.
- Influenza vaccination is also important for close contacts of people with diabetes to help prevent the spread of influenza infection to these vulnerable individuals.
  - This includes household members and health care workers.

<sup>5</sup> *MMWR* 2006;55(RR-10):1-41, <sup>6</sup> *MMWR* 2004;53(43):1007-1015

<sup>7</sup> Available at: <http://www.diabetes.org/diabetes-myths.jsp>

# Key Facts

- Studies have found more than 70 percent reduction in hospitalizations and death among adults with diabetes receiving an influenza vaccination.<sup>8</sup>
- In addition, research has shown nearly 80 percent decrease in hospital admissions among children and adults with diabetes.<sup>9</sup>

<sup>8</sup> Looijmans-Van Den Akker I, et al, *Diab Care* 2006;29:1771-1776

<sup>9</sup> Colquhour, Nicholson, et al, *Epidemiol Infect* 1997;119:335-341

# Key Facts

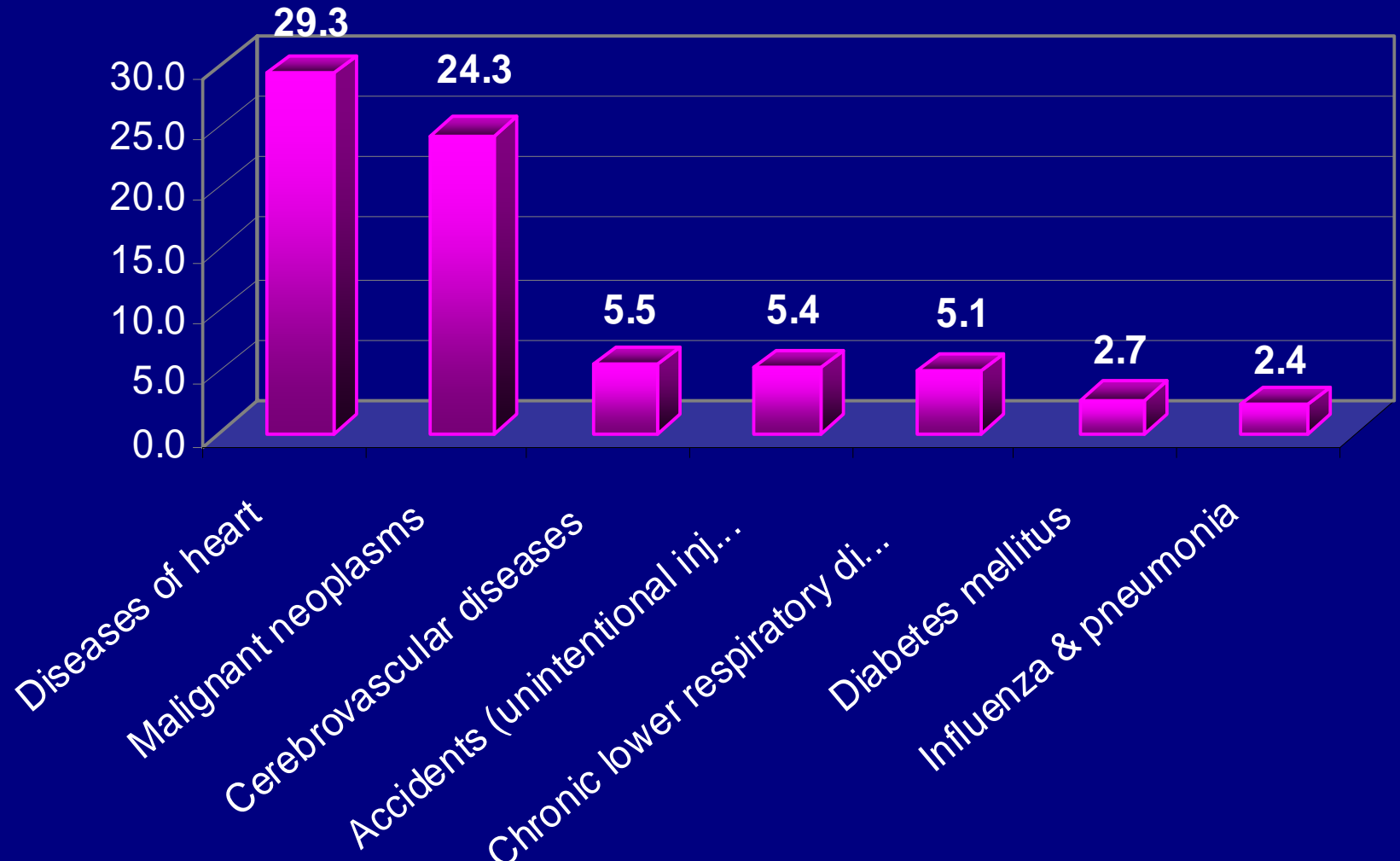
## ■ Influenza: Disease Overview

- Influenza, commonly called the flu, is a highly contagious virus that can infect the nose, throat and lungs, and is one of the most severe illnesses of the winter season.<sup>5</sup>
- The disease causes an estimated 36,000 deaths and more than 200,000 hospitalizations in the U.S. each year. <sup>10,11</sup>
- Up to 1 in 5 Americans are infected with the influenza virus each season.<sup>5</sup>
- Symptoms may include high fever, chills, dry cough, headache, runny nose, sore throat and muscle pain; these symptoms can persist for days followed by fatigue for up to two weeks.<sup>12</sup>
- Children with influenza may have symptoms that are uncommon in adults, like diarrhea, vomiting or nausea. <sup>12</sup>

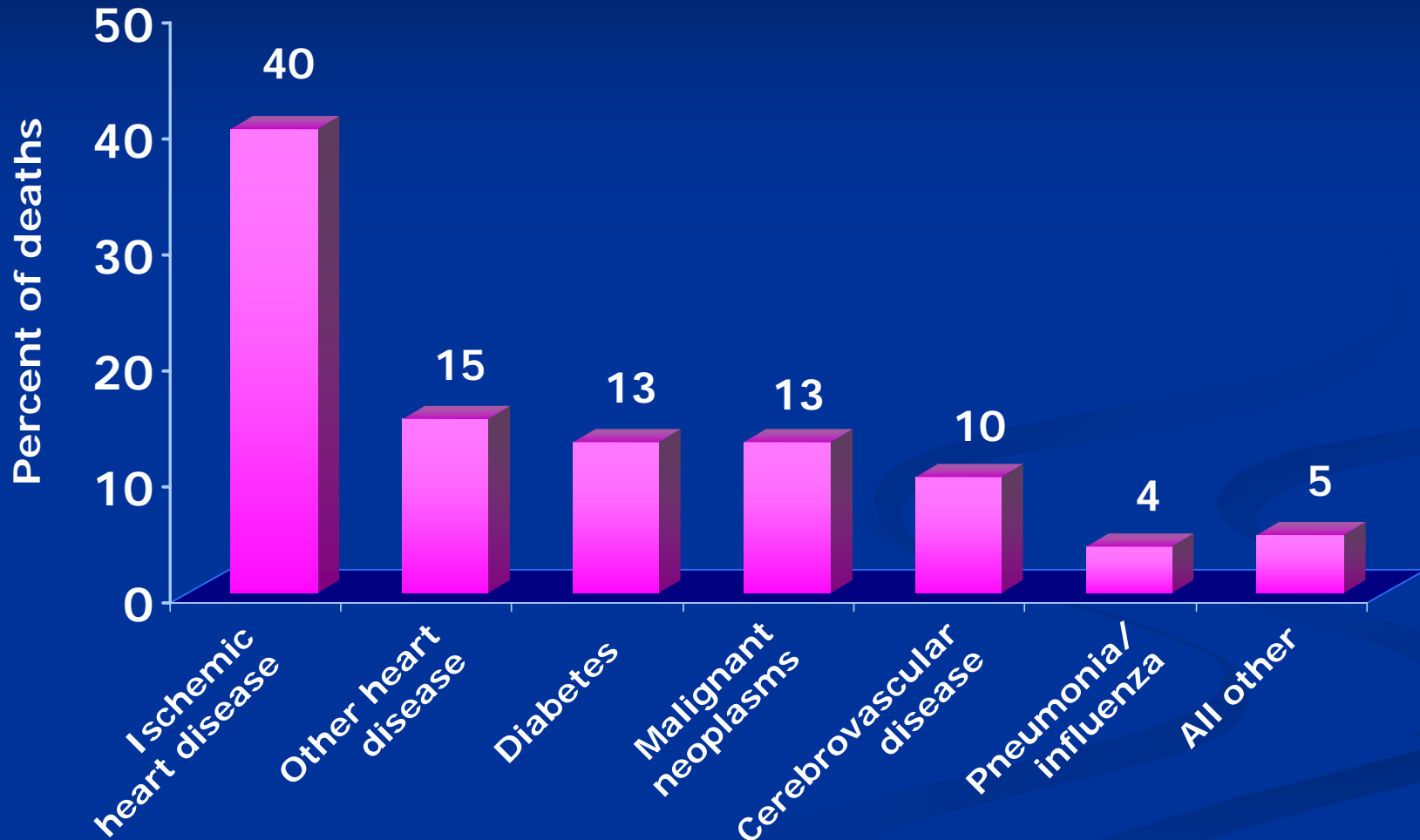
<sup>10</sup> Thompson, et al, *JAMA* 2003;289:179-186., <sup>11</sup> Thompson, et al, *JAMA* 2004;292:1333-1340.,

<sup>12</sup> Cox NJ, et al, *Lancet* 1999;354(9186):1277-1282.

# Leading Causes of Death in 2000 in the US (% of Total Deaths)

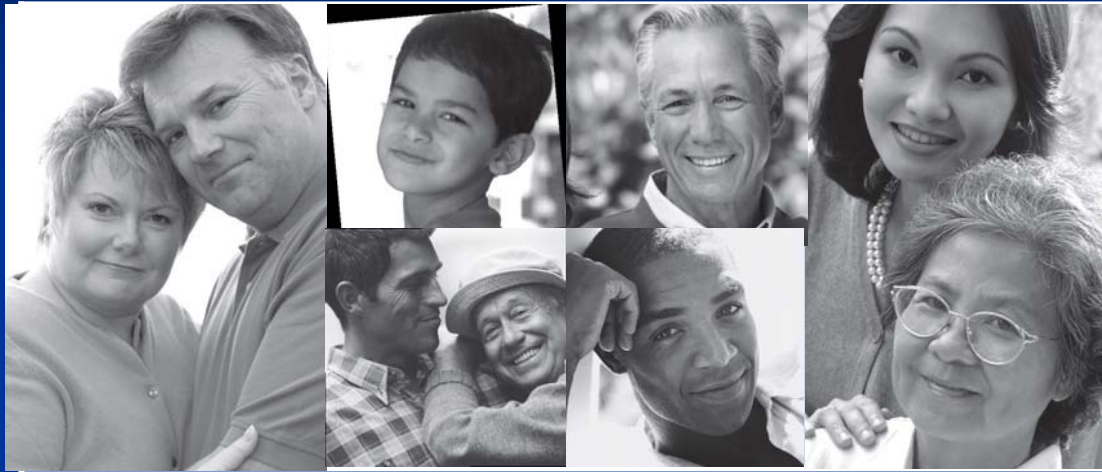


# Leading Causes of Death in persons with Diabetics 1965-1988



Geiss LS, et al. In: Diabetes in America. National Institutes of Health;1995.

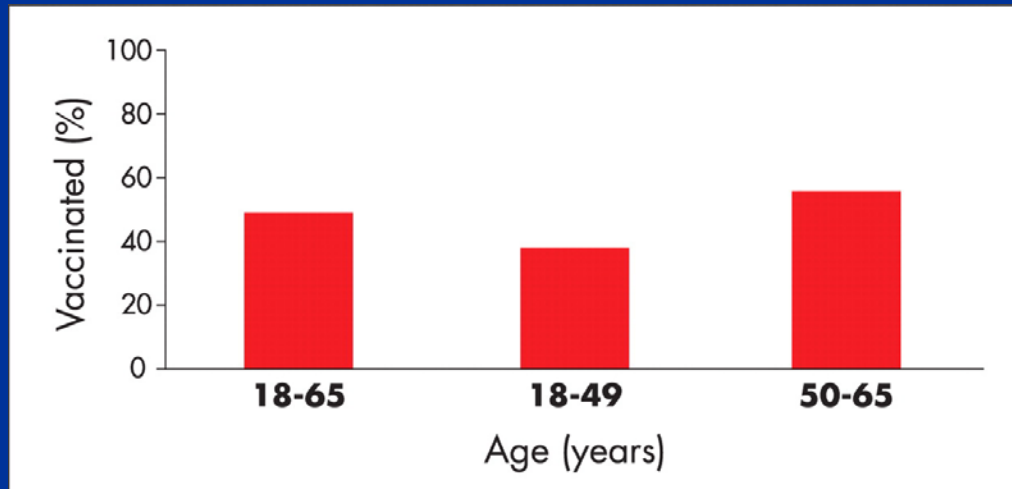
# Prevent complications in diabetics



Vaccination of people at risk for complications from influenza, such as those with diabetes, is a key U.S. public health strategy for preventing associated morbidity and mortality.

# Influenza vaccination rate in people with diabetes—U.S., 2003

Despite recommendations from CDC, ADA, and others to administer influenza vaccines annually to all diabetic patients who are 6 months of age and older, influenza vaccination rates in this population remain low.



**In fact, > 10 million Americans with diabetes currently lack the protection afforded by a single annual influenza vaccination**

# American Heart Association (AHA) American College of Cardiology (ACC)

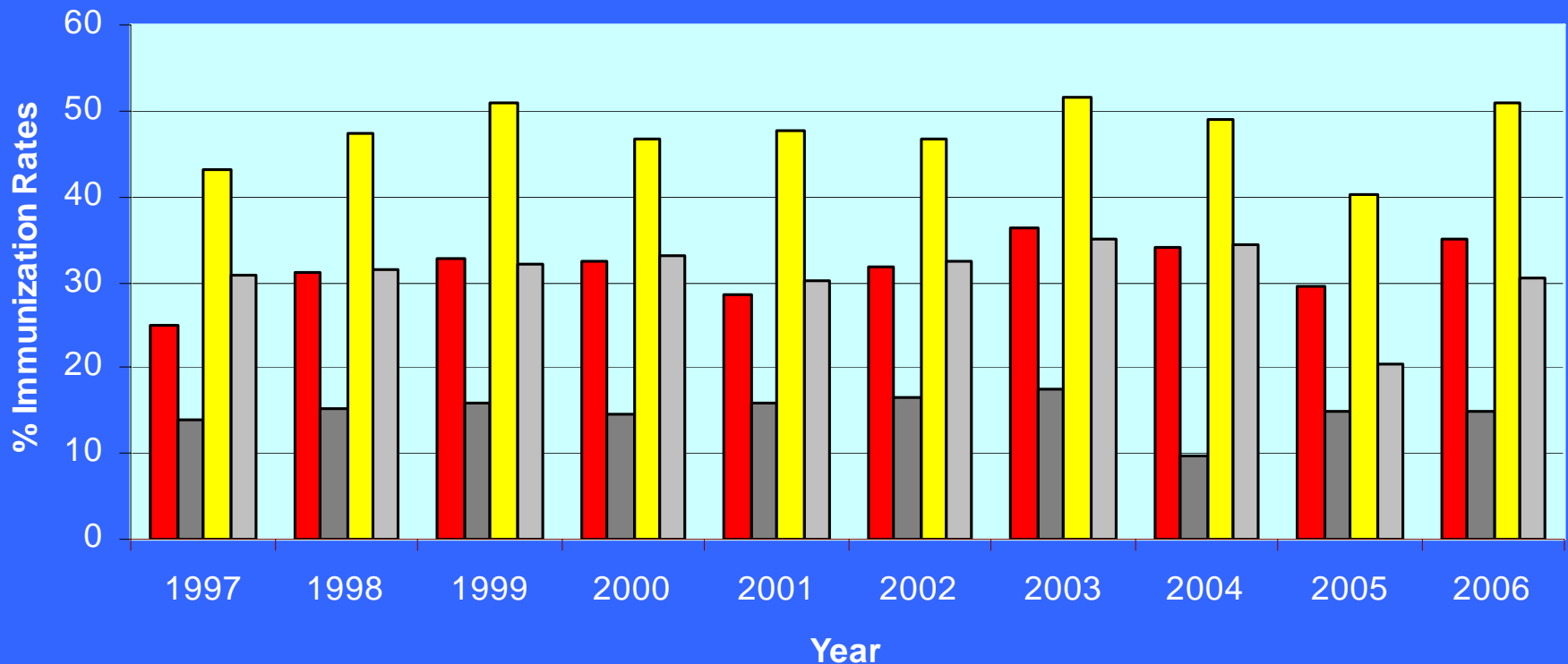
AHA/ACC Guidelines for Secondary Prevention for  
Patients With Coronary and Other Atherosclerotic  
Vascular Disease: 2006 Update:

## ■ INFLUENZA VACCINATION:

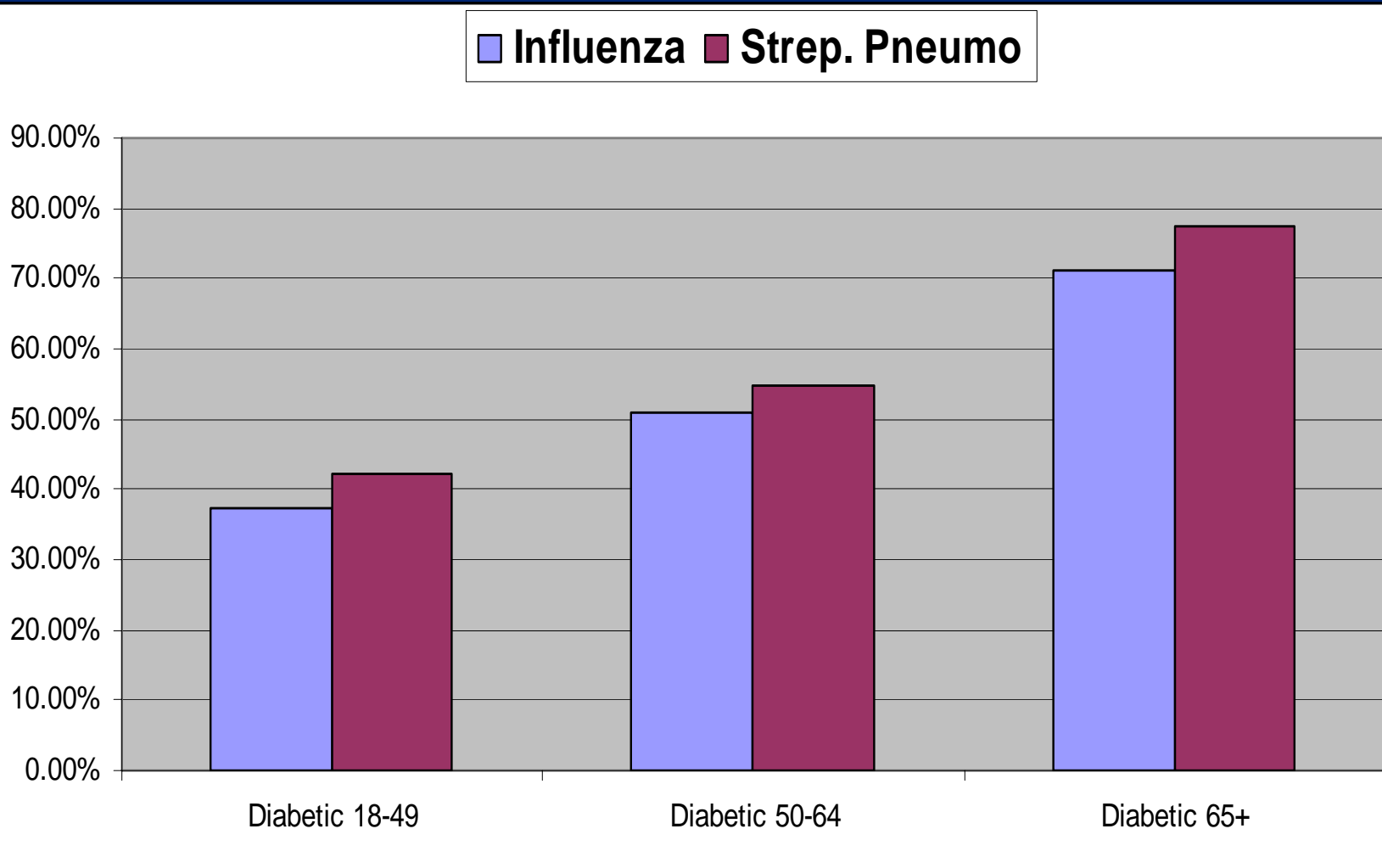
- Patients with cardiovascular disease should have an influenza vaccination

# Self-reported influenza vaccination coverage trends 1997 - 2006 among adults with diabetes by age group, National Health Interview Survey (NHIS)

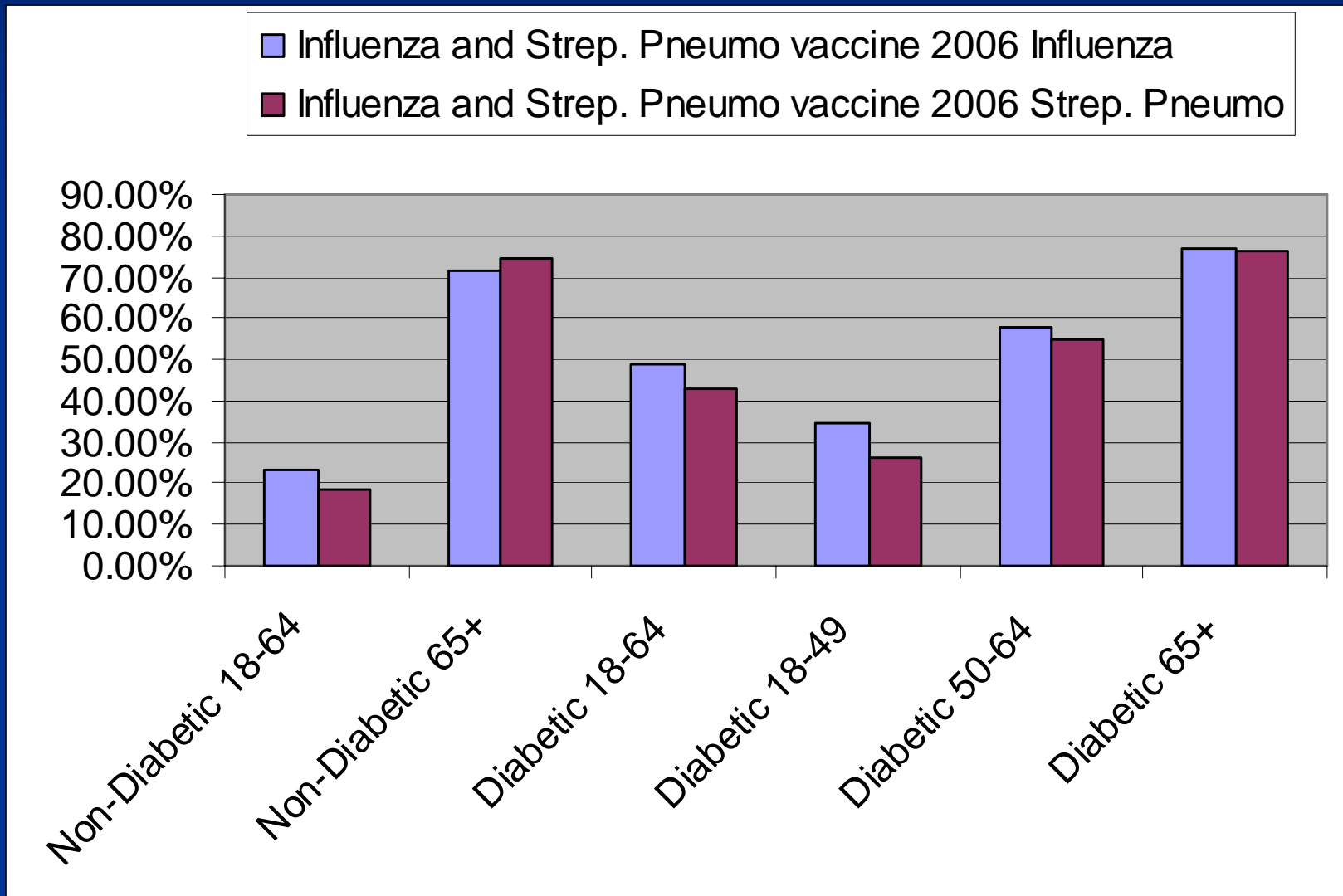
■ 18-49 With Diabetes ■ 18-49 Without Diabetes ■ 50-64 With Diabetes ■ 50-64 Without Diabetes



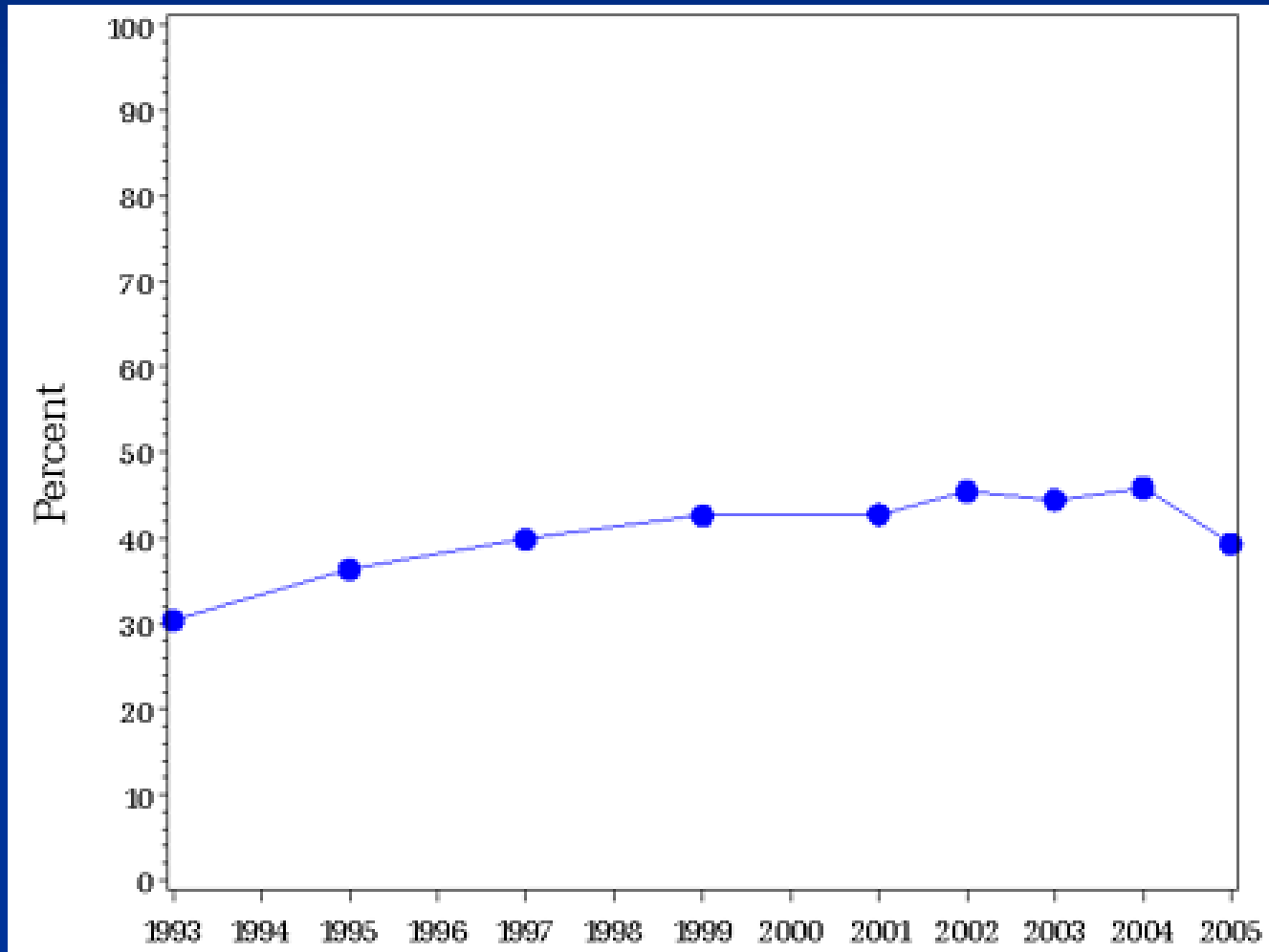
# BRFSS Weighted Data--Influenza and Strep. pneumonia vaccine Rates 2005: Oregon



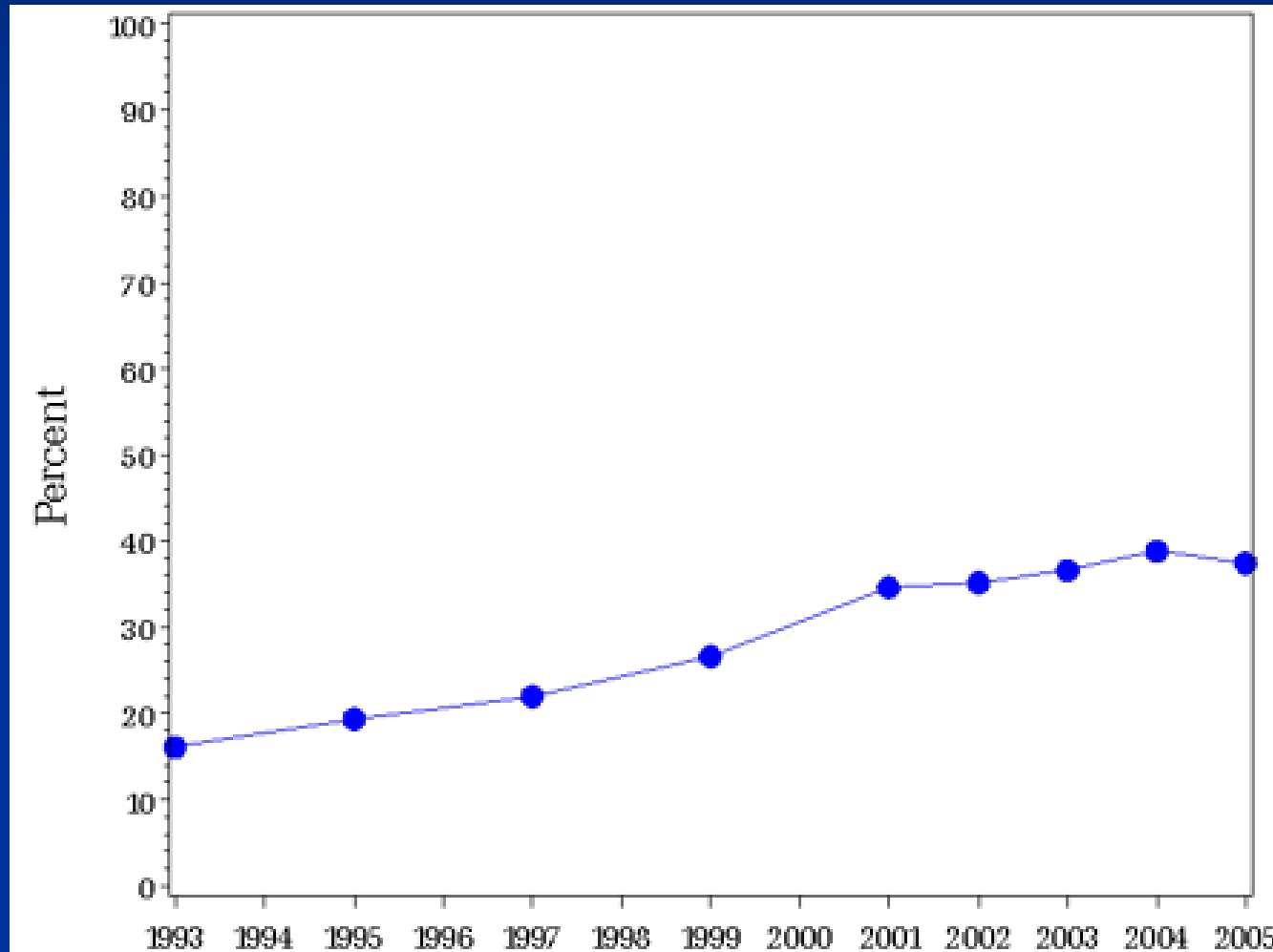
# BRFSS Weighted Data--Influenza and Strep. Pneumonia vaccine Rates 2006: Oregon



# Age-Adjusted Rates of Annual Influenza Vaccination in Adults with Diabetes, United States, 1993-2005



# Age-Adjusted Rates of (ever receiving of a) Pneumococcal Vaccination in Adults with Diabetes, United States, 1993-2005



# Adult Immunization Performance Measures: July 25, 2008

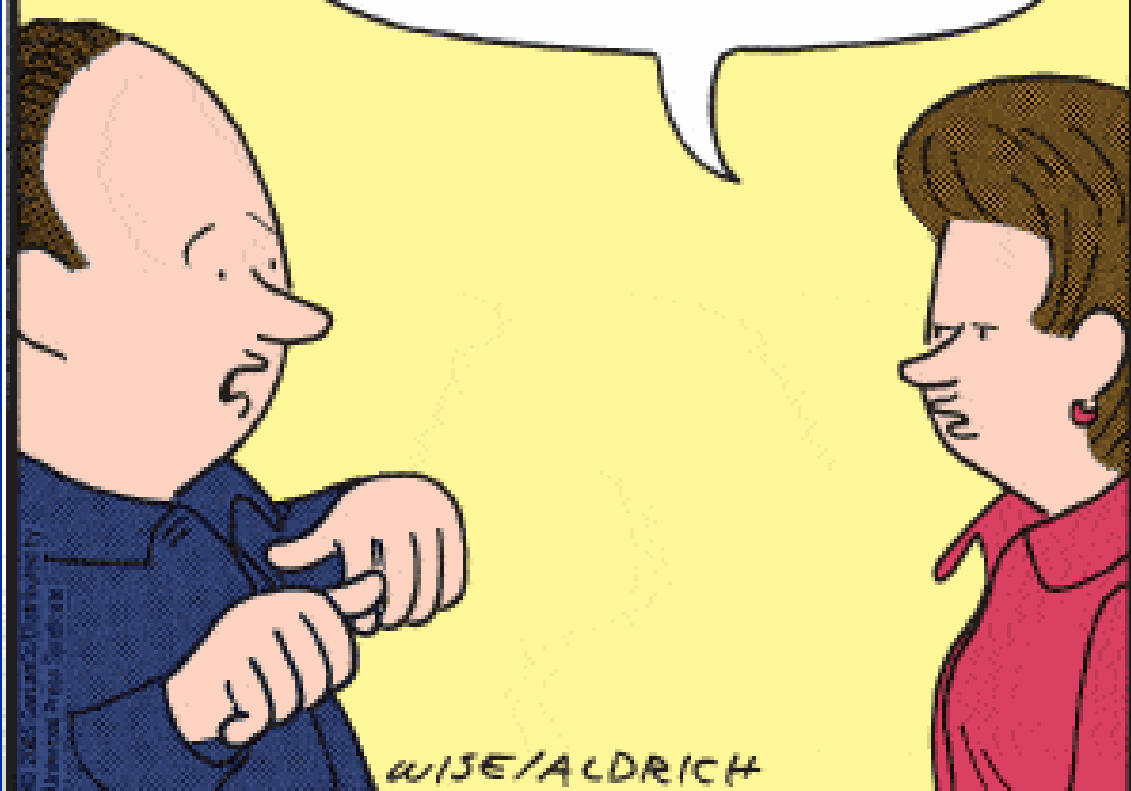
## Adult BRFSS source data

- 1. Percentage of adults aged  $\geq 65$  who received an influenza vaccine in the past 12 months
  - 2006 Data: OR = 71.3%
  - 2007 Data: OR = 73.1%
  - US = 72%
  
- 2. Percentage of adults aged  $\geq 65$  who ever received pneumococcal vaccine
  - 2006 Data: OR = 74.7%
  - 2007 Data: OR = 74.0%
  - US = 72%
  
- **Oregon ranks #1 in the US (50 states & DC)**

I DOOON'T WANT A FLU SHOT!  
THEYYYYY HUUURRRT! BESIDES,  
THEY'RE MOSTLY GIVING THEM  
TO OLD PEOPLE AND BABIES!

FACE IT. YOU QUALIFY  
ON BOTH COUNTS.

11-21



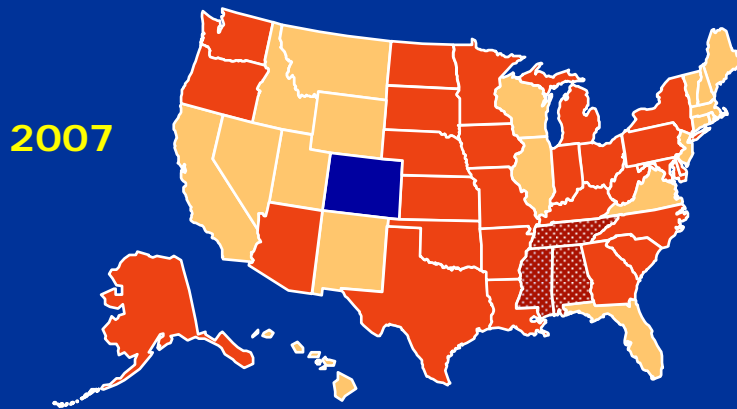
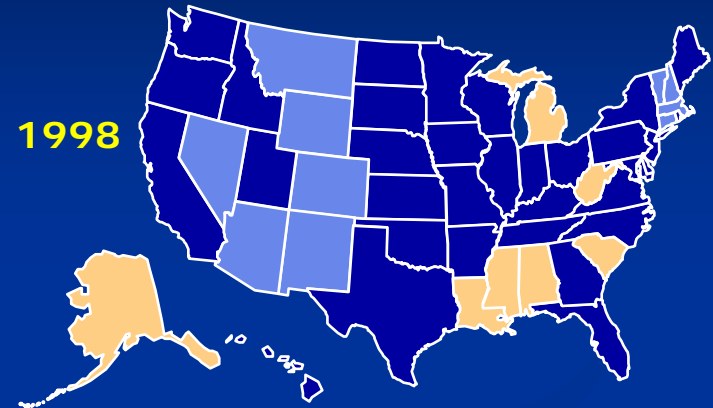
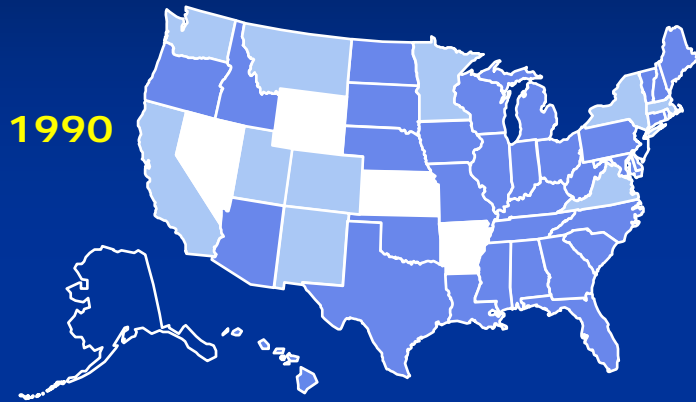
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WISE/ALDRICH

The obesity epidemic of the 21<sup>st</sup> century has broad-reaching collateral effects, including the clinically significant number of patients with newly diagnosed diabetes.

# Obesity Trends\* Among U.S. Adults BRFSS, 1990, 1998, 2007

(\*BMI  $\geq 30$ , or about 30 lbs. overweight for 5'4" person)



About 60 million adults, or 30 percent of the adult population, are now obese, which represents a doubling of the rate since 1980

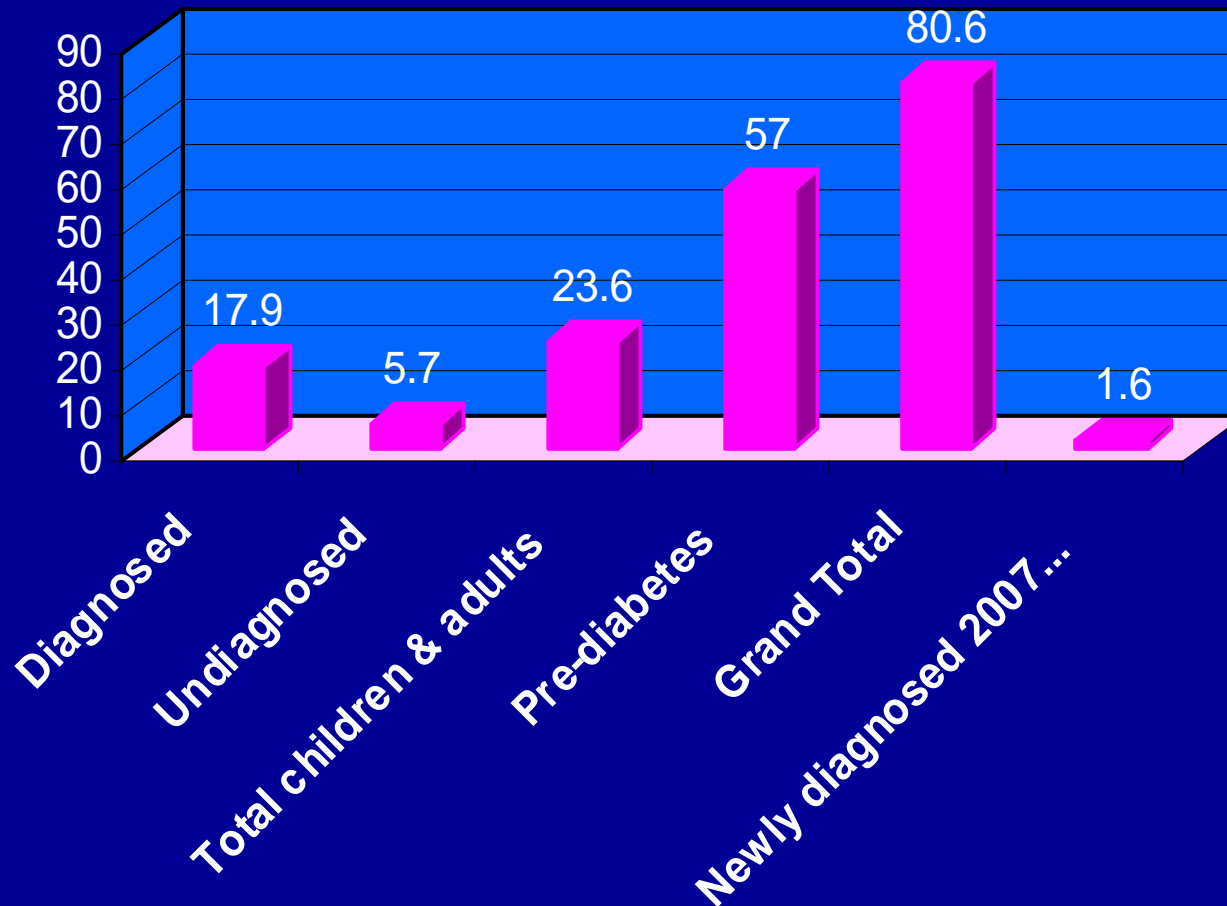


# Increasing incidence of Diabetes

- The overall U.S. prevalence of diabetes\*, was estimated in 2005 at 7% (nearly 21 million people)
  - Minority groups and the elderly disproportionately affected
- The at-risk population for complications also includes the even larger (41 million) pre-diabetic group
- If the trend of increasing incidence continues, more than one-third of Americans born in 2000 will develop diabetes

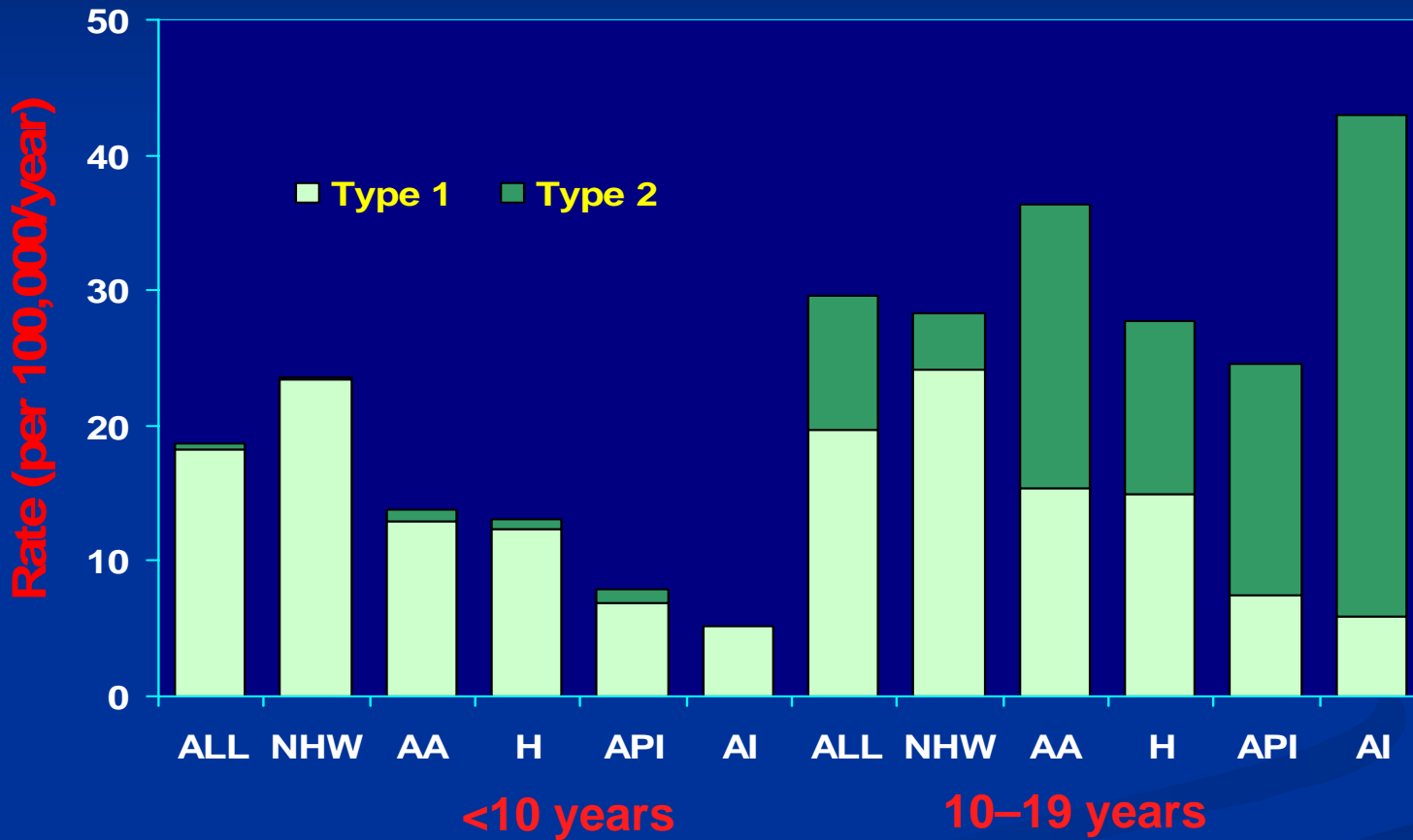
**\*defined by a fasting glucose > 126 mg/dl or a 2-hour plasma glucose of 200 mg/dl after an oral glucose load (oral glucose tolerance testing, OGTT)**

## Total Prevalence of Diabetes & Pre-diabetes (million)



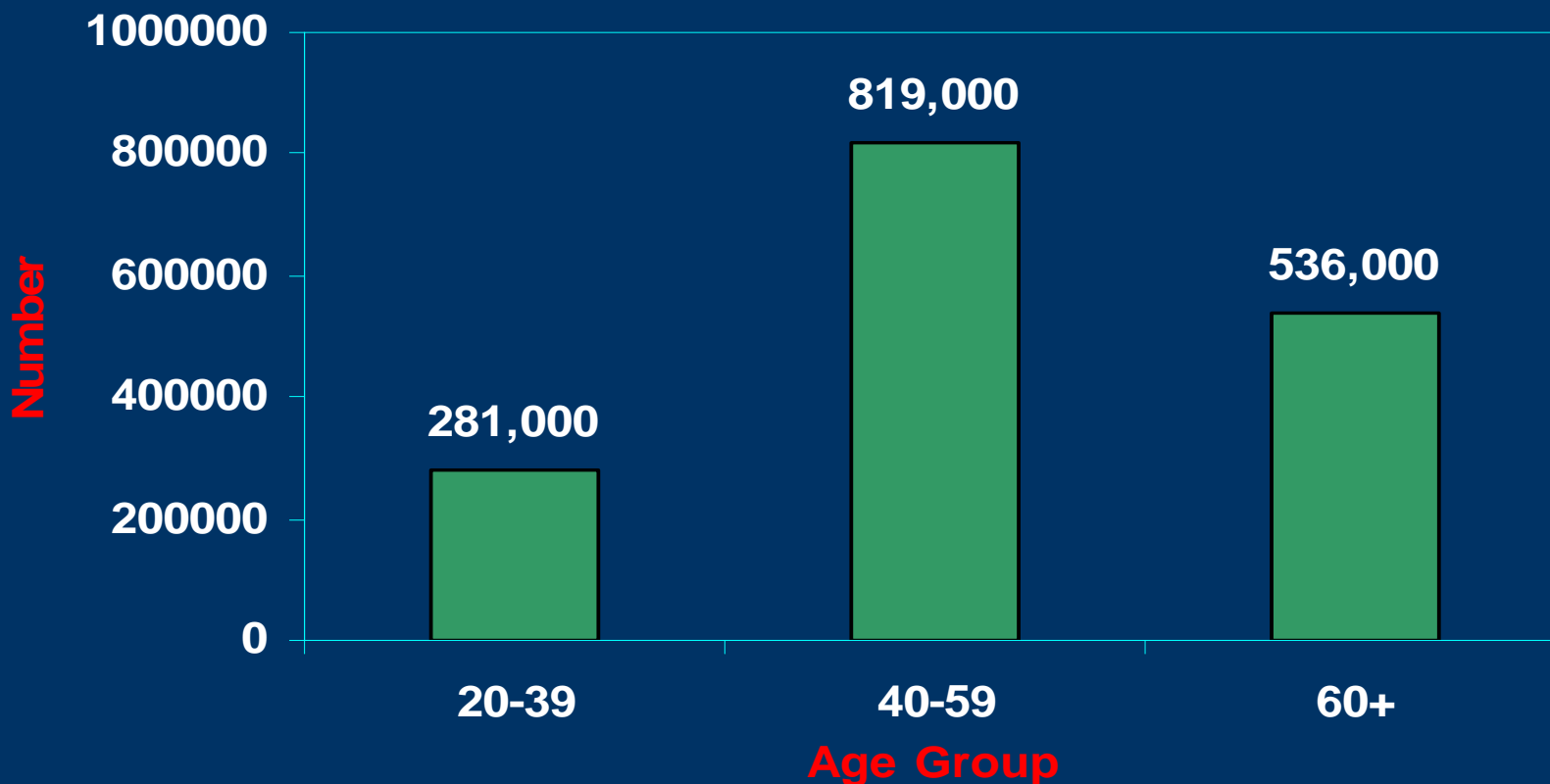
**Total: 23.6 million children and adults -- 8.0% of the population -- have diabetes.**

# Rate of new cases of type 1 and type 2 diabetes among youth aged <20 years, by race/ethnicity, 2002–2003



NHW=Non-Hispanic whites; AA=African Americans; H=Hispanics; API=Asian/Pacific Islanders; AI=American Indians  
 CDC. National Diabetes Fact Sheet, 2007.  
 Source: SEARCH for Diabetes in Youth Study

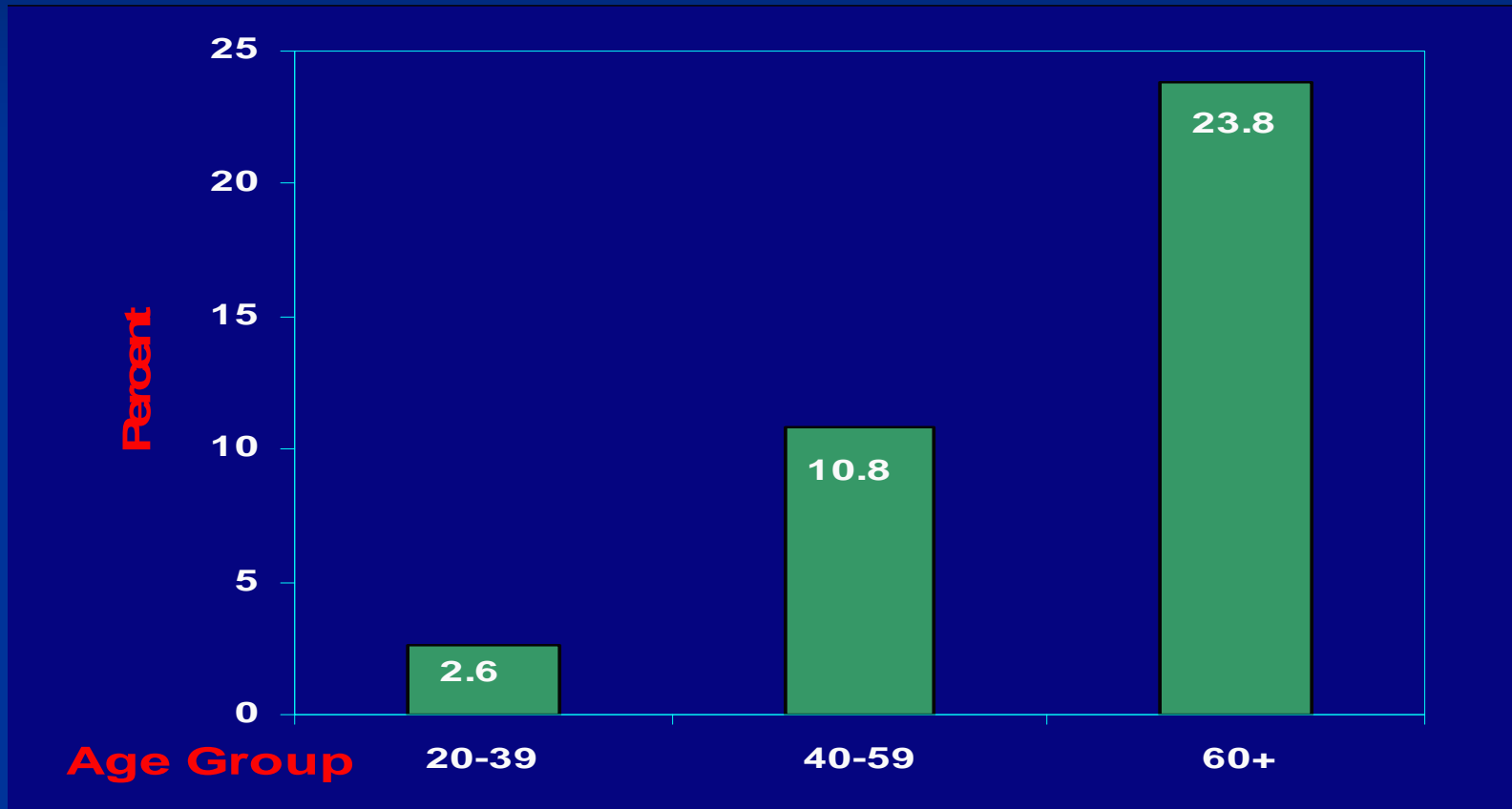
# Estimated number of new cases of diagnosed diabetes in people aged 20 years or older, by age group, United States, 2007



CDC. National Diabetes Fact Sheet, 2007.

Source: 2004–2006 National Health Interview Survey estimates projected to year 2007.

# Estimated prevalence of diagnosed and undiagnosed diabetes in people aged >20 years, by age group, United States, 2007

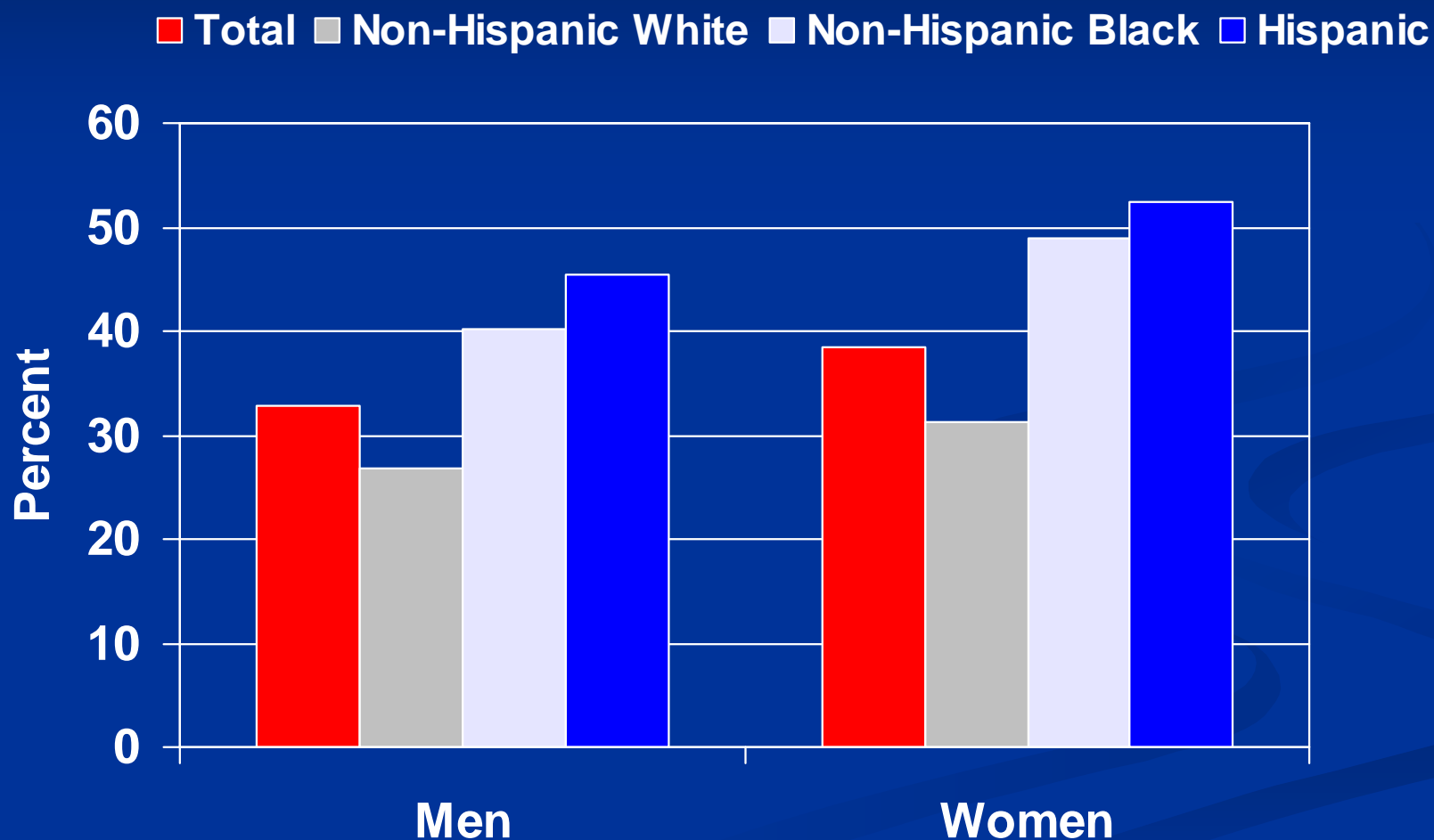


CDC. National Diabetes Fact Sheet, 2007.

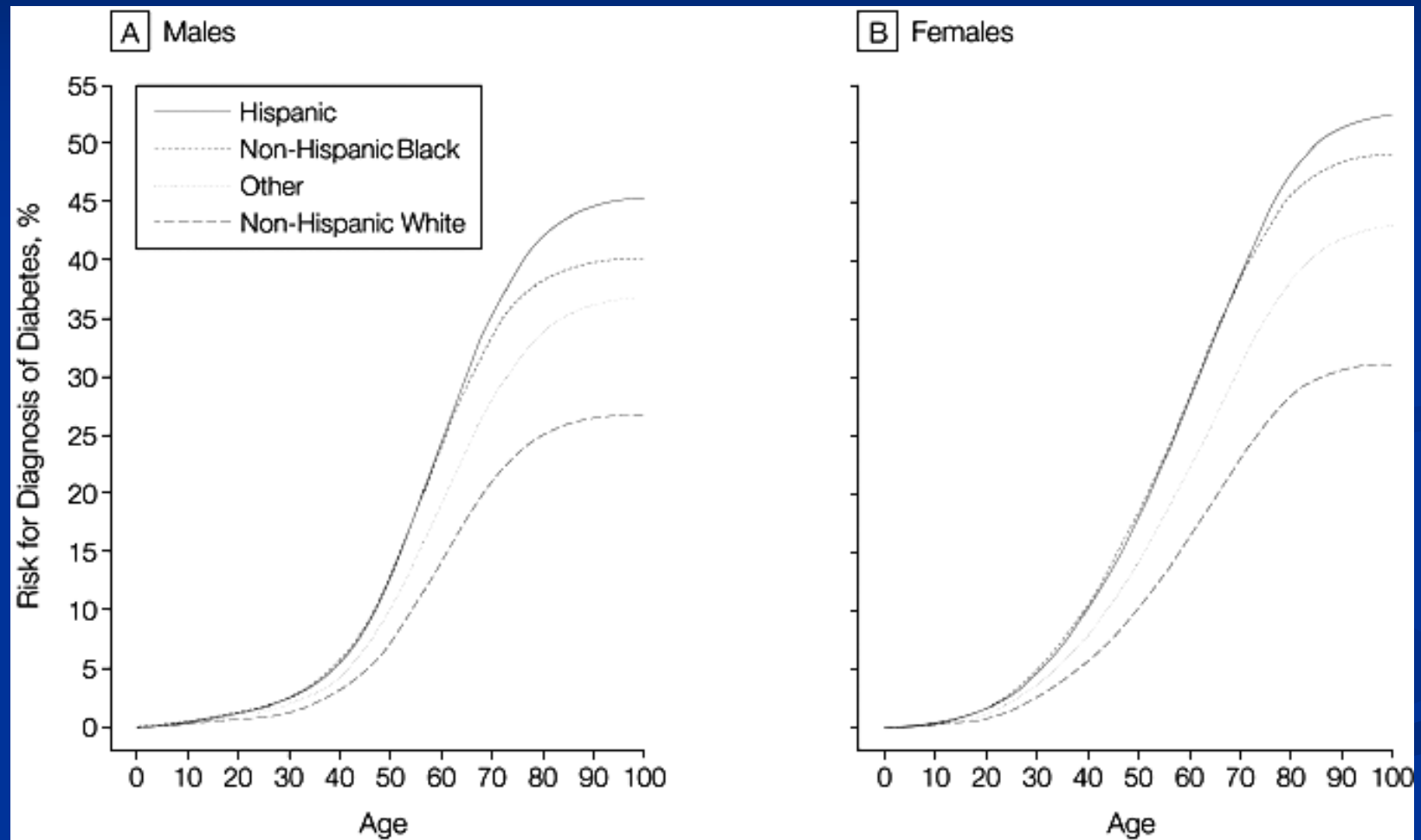
Source: 2003–2006 National Health and Nutrition Examination Survey estimates of total prevalence (both diagnosed and undiagnosed) were projected to year 2007.

**If the trend of increasing incidence continues, more than one-third of Americans born in 2000 will develop diabetes.**

# Estimated lifetime risk of developing diabetes for individuals born in the United States in 2000



# Cumulative Lifetime Risk for Diagnosis of Diabetes for individuals born in 2000



# Forecast of the number of individuals diagnosed with diabetes (in millions).

Prevalence (%)	Age-group (in years)					All ages
	0–19	20–44	45–64	65–74	≥75	
2005	0.33	2.39	10.12	18.34	15.99	5.62
2010	0.41	2.91	11.60	20.68	18.93	6.84
2020	0.46	3.59	14.52	23.32	24.20	8.88
2030	0.47	4.00	15.90	25.96	27.69	10.38
2040	0.47	4.07	16.72	28.70	30.32	11.35
2050	0.48	4.18	17.76	30.10	32.69	12.00
<b>% change 2005–2050</b>	<b>45</b>	<b>75</b>	<b>75</b>	<b>64</b>	<b>104</b>	<b>114</b>

Impact of recent increase in incidence on future diabetes burden:  
Narayan et al., *Diabetes Care* 2006;29:2114-2116.

# Impact of Influenza in the United States

- Influenza is a common and potentially serious viral infection, with an annual incidence of 5-20%
- During the past decade, influenza contributed to an estimated 36,000 deaths and >200,000 hospitalizations
- The current annual rates of hospital admissions and deaths due to influenza are likely to be higher because more individuals have moved into high-risk groups (the elderly and individuals with diabetes)
- Annual direct costs associated with influenza: \$3 billion
- The indirect costs of illness, including absenteeism: \$12 billion

# Impact of Influenza

- The course of influenza illness can either be uncomplicated and self-limited or associated with complications
  - An uncomplicated course of influenza can last up to 15 days, with restricted activity for 5-6 days, including 3-4 days of bed rest
- While people of all ages are at risk of influenza infection, complications are most common in those at the extremes of age and with certain underlying medical conditions, such as diabetes, asthma, and cardiovascular disease.
- Complications include secondary bacterial pneumonia, sinusitis, bronchitis, and myocarditis, as well as croup, bronchiolitis, and acute otitis media in children

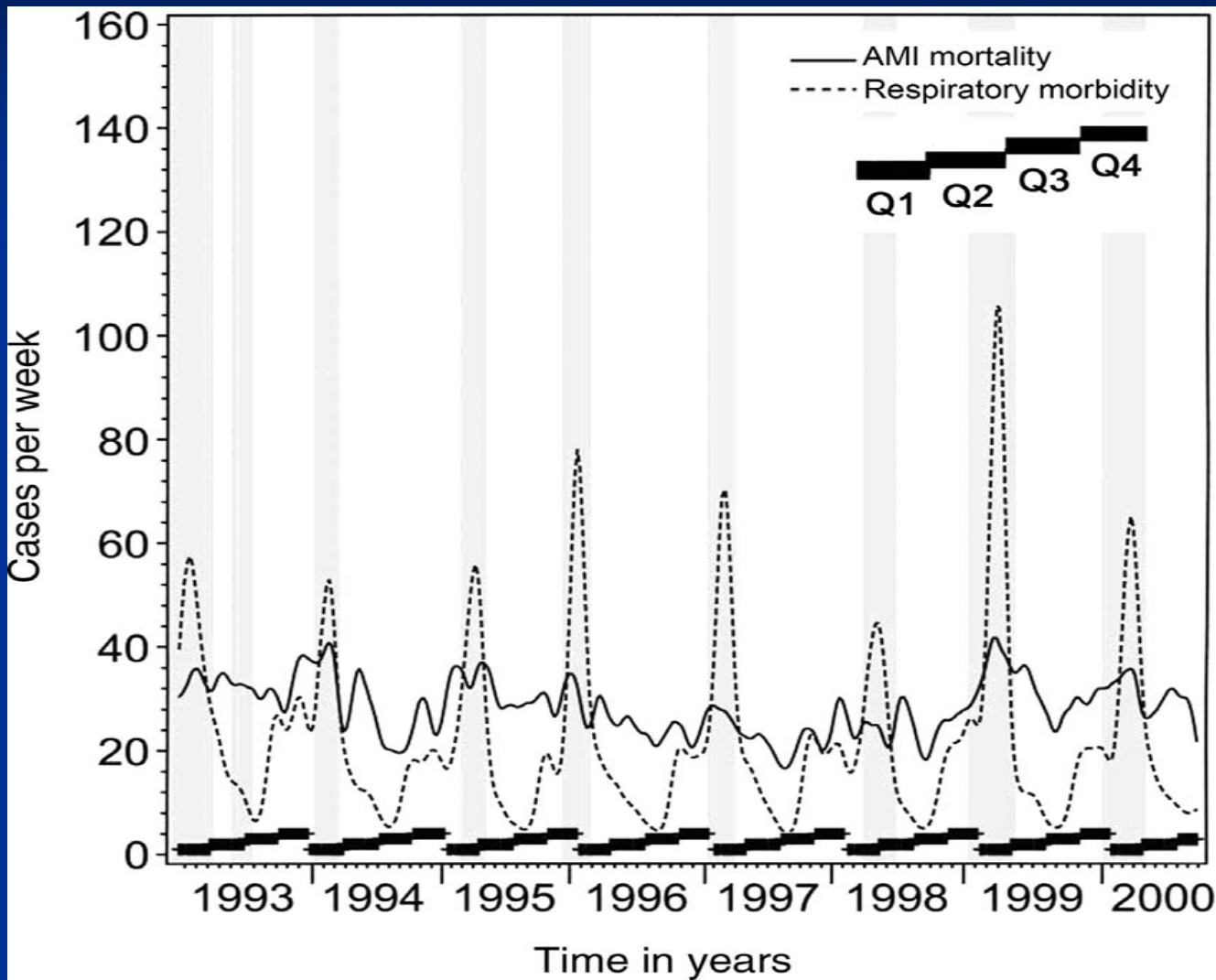
# Impact of Influenza

- All bacterial and viral infections, including influenza, are associated with significant morbidity and mortality in patients with diabetes, in part because of poor glycemic control and acidosis, as well as comorbid conditions (e.g., advanced age, renal disease, and cardiovascular disease)
- The incidences of diabetic ketoacidosis and associated hospital admissions are increased during influenza epidemic years
- In one study the risk of hospitalization was increased sixfold in patients with diabetes, compared with age- and sex-matched control subjects
- At-risk patients, including those with diabetes, are also at increased risk of death from influenza and secondary pneumonia

# Impact of Influenza

- Influenza can trigger acute myocardial infarction and increase coronary heart disease death
- These results take on special significance for patients with diabetes, whose risk of an acute cardiovascular event, as well as short-term (inpatient) and long-term risk of death following acute myocardial infarction is two- to fourfold higher than in patients without diabetes

# Deaths due to acute myocardial infarction & morbidity from acute respiratory disease from 1993 to 2000



# Influenza Vaccination Outcomes in Patients With Diabetes

- Protection from vaccination has been shown to be comparable between patients with diabetes and healthy control subjects
- Safety and efficacy of vaccination against serious morbidity and mortality of influenza infection in patients with diabetes, in high-risk patients, including those with diabetes and/or cardiovascular disease has been documented
- In multiple clinical studies the vaccine was well tolerated, with mild soreness at the vaccination site being the most common side effect

# Incidence of Complications during the 1999–2000 Influenza A Epidemic

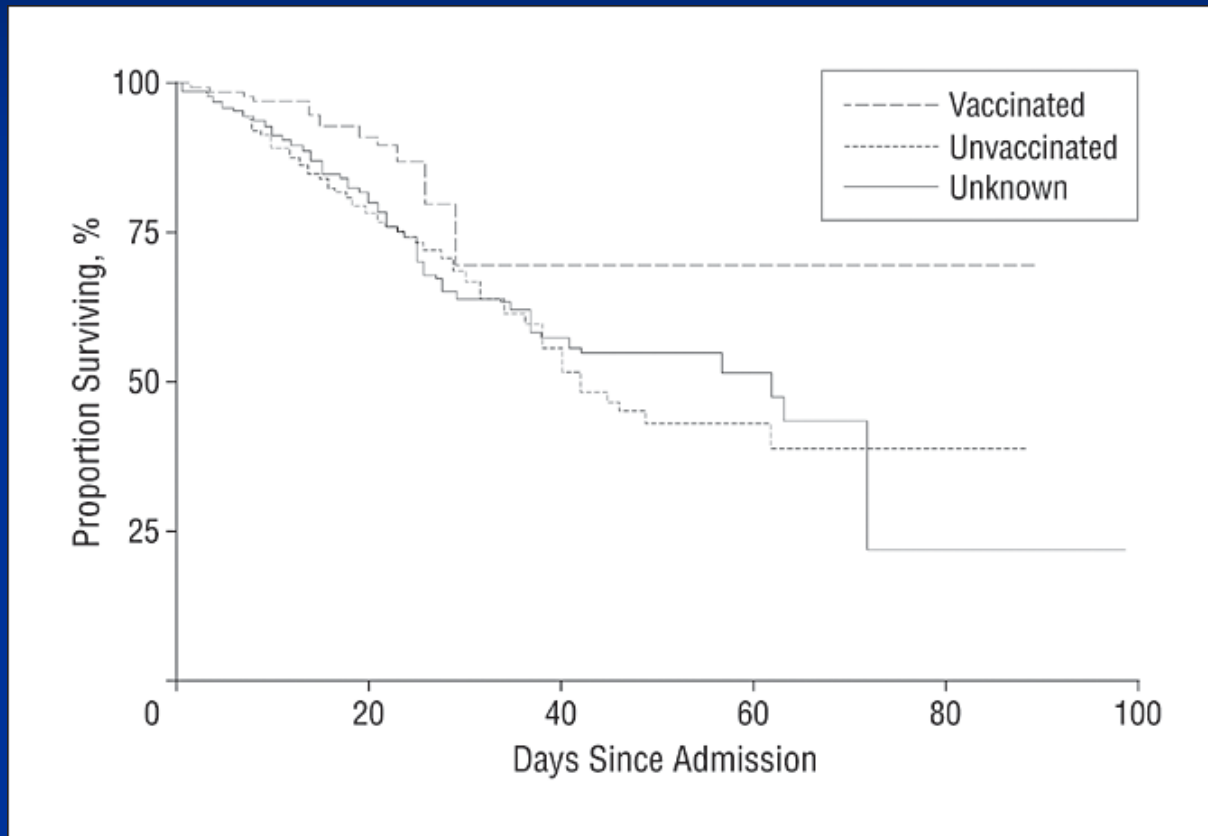
	<u>Aged 18-64 years</u>		<u>Aged ≥65 years</u>	
	Unvaccinated	Vaccinated	Unvaccinated	Vaccinated
Deaths	3.1	2.0	18.7	8.4
Hospitalizations	25.2	12.0	11.2	13.9
Total	28.3	14.0	29.9	22.3

Incidence rates were calculated (in a cohort of 9,238 diabetic patients) as the number of case-periods within an age subgroup divided by the number of individuals at baseline from the same group, multiplied by 1,000.

## Mortality among diabetic patients with and without influenza vaccination during winter 2000–2001

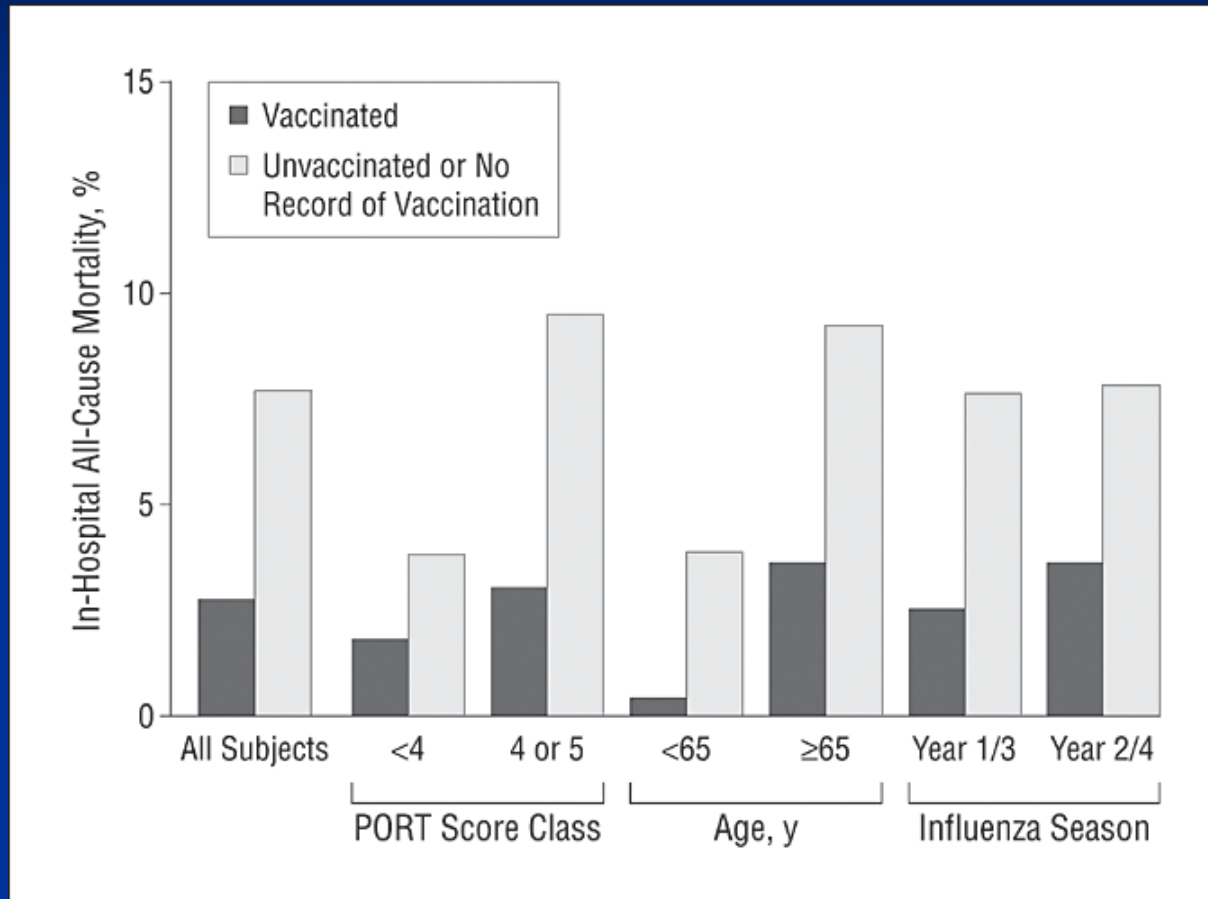
Age	Vaccine	<i>n</i>	No. of Deaths	Mortality Rate (%)
<b>Men</b>				
65–75	No	2,467	39	1.6%
	Yes	2,728	16	0.6%
75–85	No	932	50	5.4%
	Yes	1,346	27	2.0%
>85	No	207	22	10.6%
	Yes	249	8	3.2%
<b>Overall</b>	No	3606	111	3.1%
	Yes	4323	51	1.2%
<b>Women</b>				
65–75	No	2,749	37	1.3%
	Yes	2,466	13	0.5%
75–85	No	1,459	53	3.6%
	Yes	1,254	4	0.3%
>85	No	369	28	7.6%
	Yes	157	7	4.5%
<b>Overall</b>	No	4,577	118	2.6%
	Yes	3,877	24	0.6%

# In-hospital Survival in individuals with Community Acquired Pneumonia (CAP)



Kimberly A. Spaude, MPH; Elias Abrutyn, MD; Cheryl Kirchner, RN, MS; Alex Kim, MS; Jennifer Daley, MD; David N. Fisman, MD, MPH, FRCP(C)  
*Arch Intern Med.* 2007;167(1):53-59.

# In-hospital All-cause Mortality



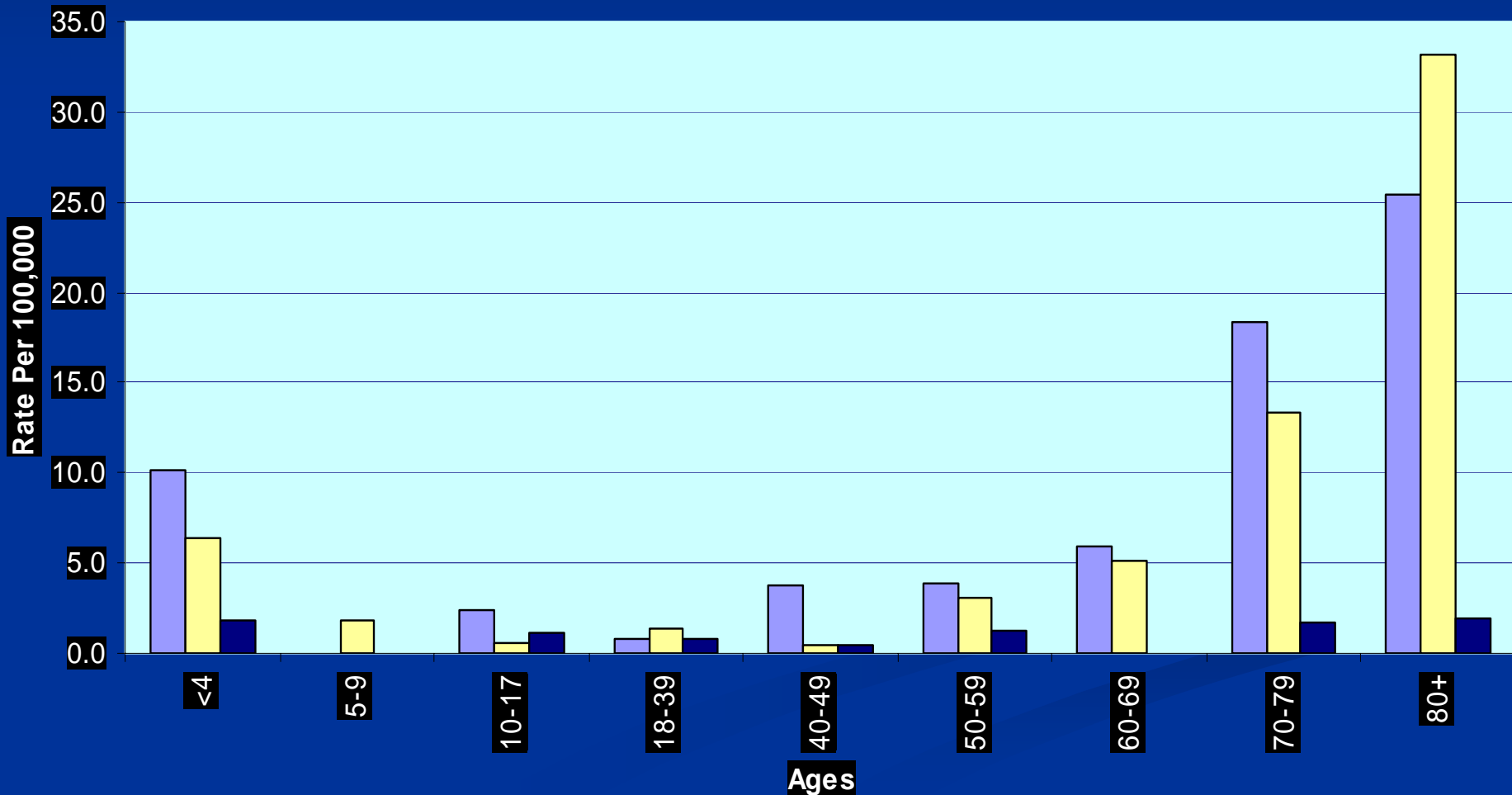
**PORT: Pneumonia Outcomes Research Team, Years 1/3 are the 1999-2000 and 2001-2002 influenza seasons, while years 2/4 are the 2000-2001 and 2002-2003 influenza seasons.**

***Arch Intern Med.* 2007;167(1):53-59**

# Influenza-Associated Hospitalizations by Age Group and Virus Type, Oregon, 2007-08

(through 4/24/08)

Flu Type A    Flu Type B    Flu Type Unknown



**Taken together, study findings support the value of influenza vaccination for patients with diabetes, with data showing benefits based on fewer hospitalizations and deaths.**

# Vaccine effectiveness

## Age-group 18–64 years:

Hospitalizations for influenza, pneumonia, other acute respiratory disease, myocardial infarction, congestive heart failure, stroke, or diabetes event were prevented by 70%

## Age-group $\geq 65$ years:

Prevented 56% of deaths

Hospitalization was prevented by 14%

## Regardless of age:

Prevented 56% of any complications

Hospitalizations were prevented by 54%

Prevented deaths by 58%

# Live Virus Influenza Vaccine

- Live attenuated viruses are contraindicated in patients who have decreased immune response\*
- Anyone with diabetes is immunosuppressed to some extent\*
- CDC & Manufacturers of the live-virus vaccine warn against using live, attenuated influenza vaccine in people with metabolic disorders such as type 2 diabetes

\* Susan E. Spratt, MD Assistant Professor & Clinical Director of the Endocrine Division at Duke Medical Center, Durham, North Carolina

# Vaccine Recommendations for People With Diabetes

- ADA & CDC recommend annual influenza vaccination for all patients with diabetes  $\geq 6$  months of age
- Vaccination each year is required because of waning immunity and changes in circulating strains (antigenic drift)
- For children  $< 9$  years of age who have never been vaccinated, the ACIP recommends administration of two influenza vaccine doses, separated by at least 1 month, with the second dose administered before December

# Vaccine Recommendations for People With Diabetes (contd.)

In addition:

- Close household contacts of and healthcare workers providing care to people with diabetes should receive annual influenza vaccination to decrease person-to-person transmission

# Strategies to Increase the Reach of Influenza Vaccination

## ■ Increase vaccine access

- Vaccine-only clinics
- Extended office hours
- Vaccinate into December and beyond

## ■ Increase demand

- Consumer education
- Strong provider recommendations

## ■ Overcome practice-related barriers

- Standing orders
- Provider reminders
- Addition of influenza vaccination to quality-care checklists

# Pharmacist-Managed Immunization Campaign

Improved influenza vaccination rates in a rural population as a result of a pharmacist-managed immunization campaign:

- The influenza vaccination rate increased from 28% at baseline to 54% after program initiation
- Unvaccinated patients were younger and resided in more urban areas than vaccinated patients; vaccinated patients had a higher frequency of cardiovascular disease or diabetes mellitus
- Vaccinated patients consistently identified the education packet and their health care providers as primary motivators for vaccination
- Pharmacist-managed vaccine program increased the influenza immunization rate in high-risk patients.

# CONCLUSIONS

- Influenza virus causes an unpleasant and potentially debilitating viral illness, resulting in clinically significant sequelae and mortality in some affected individuals
- Influenza vaccinations remain low in people with diabetes.
- Influenza vaccinations should be offered to all individuals with diabetes  $\geq 6$  months of age.
- This simple, effective, and safe treatment can prevent an uncomfortable and potentially severe viral infection across the age span.
- Many professionals come in contact with persons with diabetes (e.g., physicians, nurses, nurse practitioners, physician assistants, pharmacists, diabetes educators) who can communicate the need for vaccination and increase the vaccination rates.

MIKE LUKOVICH DEL. AREA TODAY ONLINE © 1997 COM. 11-18-97

HEY, I'M AN OPTIMIST....

FLU SHOTS  
→



**Thank You**

**Questions,  
Please**

