

# Immunization in the Workplace

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# Sources & References

- Reducing Costs and Improving Productivity: Immunizing Employees and Dependents. National Business Group on Health, 2002.  
<http://www.businessgrouphealth.org/prevention/immunization.cfm>
- A Purchaser's Guide to Clinical Preventive Services: Moving Science into Coverage. National Business Group on Health, 2006.  
<http://www.businessgrouphealth.org/prevention/purchasers/index.cfm>

# Occupational Health & Workplace Wellness

# What Is Occupational Health?

- A population-based, preventive medicine specialty that focuses on the relationships between the worker's health, the workplace, and the community.
- Fundamental issues
  - What is the impact of work on health?
  - What is the impact of health on work?

# The Goals of Occupational Health

- Protect worker and community health
- Optimize productivity
- Reduce costs
- Reduce risk
- Treat employees as valuable human assets

# Occupational Health Services

- Health evaluation of employees
  - Employment entrance
  - Medical surveillance
  - Return to work and fitness for duty
  - Health maintenance and promotion
  - Exit or separation
- Diagnosis, treatment, and rehabilitation of occupational illness and injury

# Occupational Health Services

- Primary, urgent, and emergent treatment of non-occupational illness or injury
- Health and safety education
- Employee protection
  - Engineering
  - Administrative
  - PPE
- Epidemiological surveillance and outbreak investigation

# Occupational Health Services

- Collection and maintenance of occupational health and exposure records
- Immunization and infection control
- Regulatory compliance
- Program evaluation
- Disaster preparation
- Employee assistance
- Alcohol and drug prevention, detection, and rehabilitation

# Preventive Services

# Hierarchy of Prevention

## ■ Prevention

### ■ Primary

- Preventing the illness or injury

### ■ Secondary

- Early detection and treatment

### ■ Tertiary

- Disability prevention and rehabilitation

# Preventive Interventions

## ■ Primary

- Wellness & health promotion
- Risk appraisal and counseling
- Immunization and chemoprophylaxis

## ■ Secondary

- Screening and surveillance
- Diagnostic Testing

## ■ Tertiary

- Treatment
- Disability prevention & rehabilitation

# Delivery of Preventive Services

- **Clinical Preventive Services**
  - Individual risk factors
  - Example: Cholesterol screening, Pap smear
- **Community Preventive Services**
  - Community or environmental risk factors
  - Water fluoridation, lead screening
- **Workplace Preventive Services**
  - Employees and dependents
  - Fitness centers, HRA, EAP

# Purchaser's Guide to Clinical Preventive Services, 2006

## National Business Group on Health

**Table 1.1: Percent of all Deaths in the United States Attributable to Selected Modifiable Health Behaviors, 1990-2000<sup>13</sup>**

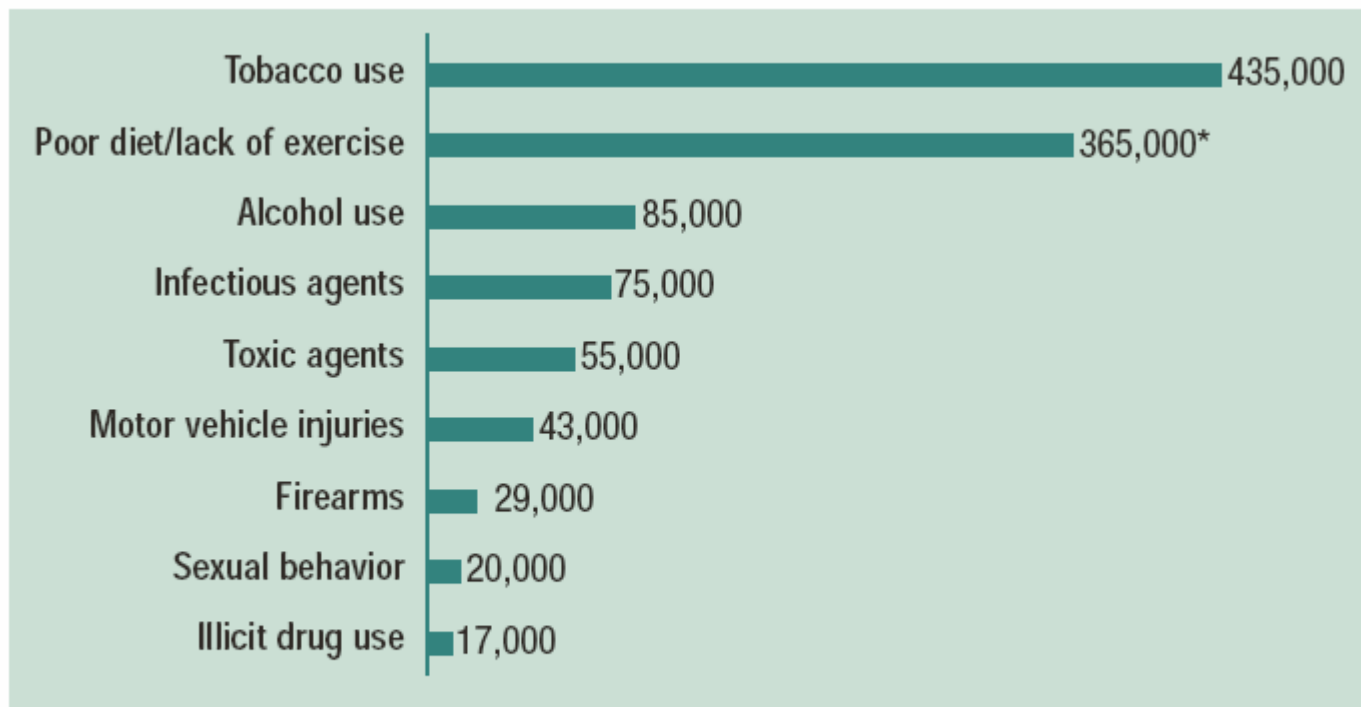
HEALTH BEHAVIOR	PERCENT OF DEATHS, 1990	PERCENT OF DEATHS, 2000
Tobacco use	19%	18.1%
Poor diet/physical inactivity	14%	15.2%*
Alcohol use	5%	3.5%
Infectious agents	4%	3.1%
Toxic agents	3%	2.3%
Motor vehicle injuries	1%	1.8%
Firearms	2%	1.2%
Sexual behavior	1%	0.8%
Illicit drug use	<1%	0.7%
<b>TOTAL</b>	<b>50%</b>	<b>46.7%</b>

Source: Mokdad A, Marks JS, Stroup DE, Gerberding JL. Actual causes of death in the United States. JAMA 2004; 291(10): 1238-1245. \* Correction published: Mokdad A, Marks JS, Stroup DE, Gerberding JL. Correction: Actual causes of death in the United States 2000. JAMA 2005; 293(3): 293-294.

# Purchaser's Guide to Clinical Preventive Services, 2006

## National Business Group on Health

Figure 1.2: Underlying Causes of Death in the United States, 2000<sup>13</sup>



Source: Mokdad A, Marks JS, Stroup DE, Gerberding JL. Actual causes of death in the United States. JAMA 2004; 291(10): 1238-1245.\* Correction published: Mokdad A, Marks JS, Stroup DE, Gerberding JL. Correction: Actual causes of death in the United States 2000. JAMA 2005; 293(3): 293-294.

# Workplace Preventive Services

- Reduced medical costs (employee and dependents)
- Reduced work loss (employee morbidity & mortality)
- Reduced work loss (caregiver)
- Reduced turnover
- Reduced short and long term disability
- Increased productivity
- Increased morale

# The “E” Words

## ■ Efficacy

- outcome under controlled conditions
- Can it work?

## ■ Effectiveness

- outcome under “real world” conditions
- Does it work?

## ■ Efficiency

- outcome per unit of health care resources used
- Is it worth the effort or cost?

# Cost effective

- Net cost per unit of health gained is favorable compared to other health services or the cost is “acceptable” on a “willingness to pay” basis.

# Cost saving

- Reduction in healthcare costs over the long term is greater than the cost to develop, implement, and administer the intervention

# Purchaser's Guide to Clinical Preventive Services, 2006

## National Business Group on Health

**Table 1: Direct and Indirect Savings per Dollar Spent on Select Vaccines**

Vaccine	Direct Medical Savings	Direct & Indirect* Savings
Diphtheria-Tetanus-Pertussis (DTaP)	\$9.00	\$27.00
Measles-Mumps-Rubella†(MMR)	\$14.20	\$26.00
<i>Haemophilus influenzae</i> type b (Hib)	\$3.40	\$5.40
Hepatitis B		
Perinatal	\$1.40	\$14.70
Infant	\$0.90	\$5.10
Adolescent	\$0.50	\$3.80
Varicella	\$1.20	\$4.40
Inactivated Polio Virus (IPV)	\$3.03	\$5.45
<b>All Routine‡</b>	<b>\$5.30</b>	<b>\$16.50</b>

\* Indirect savings include prevention of work loss, death, and disability

† Includes second dose of MMR

‡ Includes recommended doses of DTaP, Td, Hib, IPV, MMR, HepB, varicella vaccines (completed series)

# Childhood Vaccinations

- Prevents 13.6 million illnesses
- Prevents 33,000 deaths
- Saves \$10 billion in direct medical costs
- Saves \$43 billion in societal costs
- Yet 24% of toddlers nationally are not fully immunized

# Immunizations as a Preventive Service

# Benefits of Immunization

## ■ Individual

- Prevention of symptomatic illness
- Improved productivity and quality of life
- Prevention of disability and death

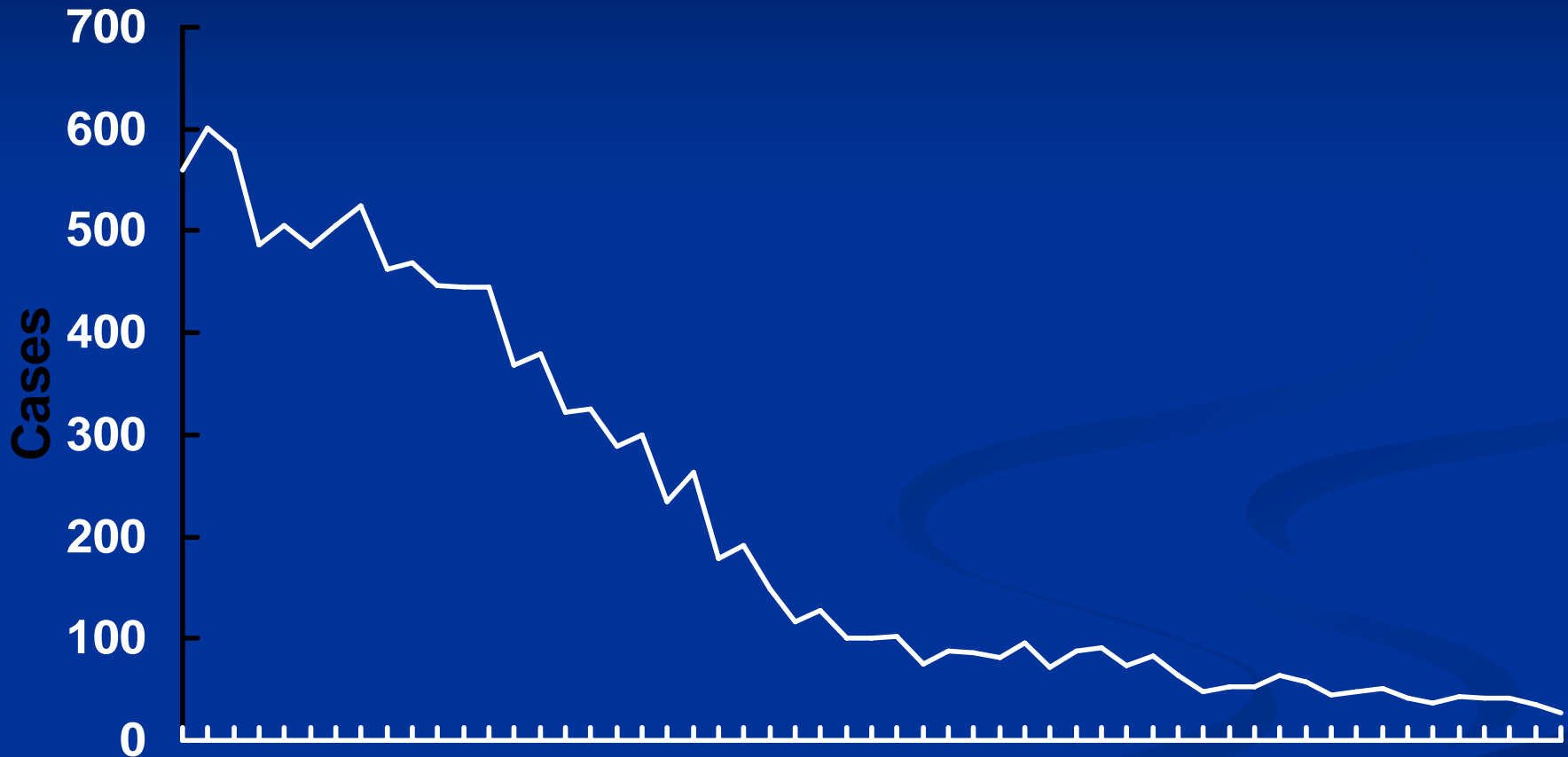
## ■ Society

- Herd immunity
- Prevention of outbreaks
- Reduction in healthcare and social benefit costs

# Recent Historical Perspective

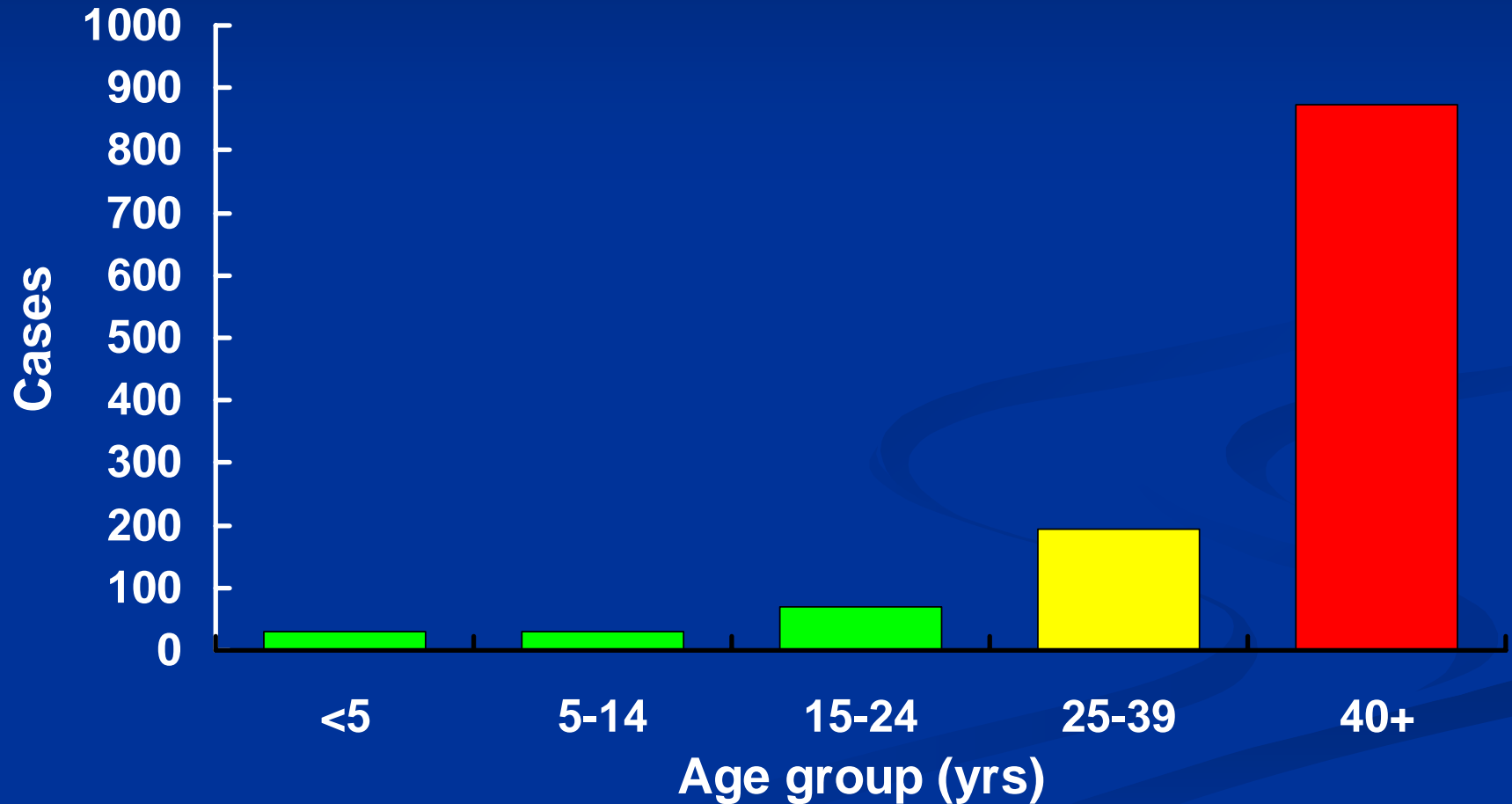
- Mumps Outbreak at Chicago Futures Exchange 1987
  - 116 confirmed cases at three exchanges (21 with complications, 9 hospitalized)
  - MMWR 1988:37(35); 533-8
- Rubella Outbreak in Douglas County Nebraska 1999
  - 83 confirmed cases among unvaccinated Latino population
  - Danovaro-Holliday et al. JAMA 2000:284(21) 2733-30

# Tetanus - United States, 1947-2001\*

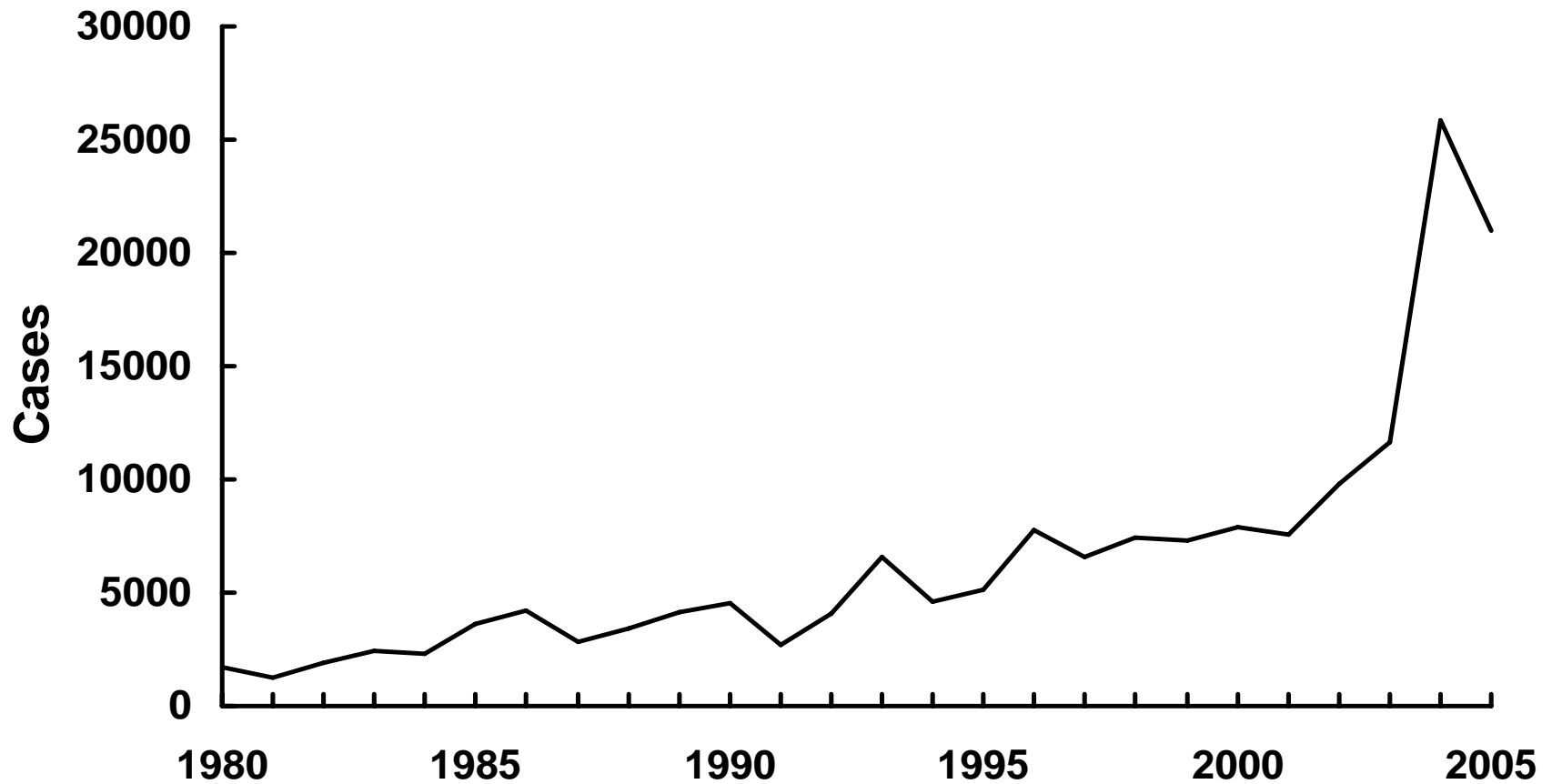


# Tetanus – United States, 1980-2000

## Age Distribution



# Pertussis—United States, 1980-2005\*



# Influenza

# Influenza

- Public Health perspective
  - Highly infectious viral illness
  - Epidemics reported since at least 1510
  - At least 4 pandemics in 19th century
  - Estimated 21 million deaths worldwide in pandemic of 1918-1919

# Influenza

- Current annual disease burden
  - 10%-20% of U.S. population infected
  - 20,000–40,000 excess deaths
  - >200,000 hospitalizations
- Economic Impact
  - \$4.6 billion in direct medical costs
  - 17 million lost work days (\$5.6 billion)
  - Total estimated cost of \$10.2 billion

# Adult Immunization - Influenza

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Muennig and Khan, 2001

- Cost-effectiveness analysis – healthy adolescents and adults
- Flu vaccine versus treatment (with oseltamivir)
- Vaccination found to reduce costs (\$25 per person) and improve quality of life (3.2 quality-adjusted hours per person) versus treatment
- Vaccination was also cost saving versus supportive care

# Influenza Vaccine/Antiviral Therapy

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- Healthy working adults (18-50 years old)
- Influenza vaccine + antiviral (rimantadine, oseltamivir, or zanamivir)
- Cost included value of symptom relief + medication side effects
- Vaccine/rimantadine \$30.97 more cost beneficial than nonvaccination and no antiviral use

# Adult Immunization - Influenza

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Postma et al, 2002

- Review of 11 cost-benefit studies
- Each considered vaccination of working adults
- 3 studies – costs exceeded benefits
- 8 studies – benefits exceeded costs (all >2:1)

# Viral Hepatitis – A & B

# Consequences Of Adult Hepatitis A And B Infections

	HepA	HepB
Symptoms of overt hepatitis	73%-90%	41%
Hospitalization	10%-26%	16%-19%
Acute liver failure	2-15 per 1000	7.3 per 1000
Liver transplant	1-3 per 1000	1.7 per 1000
Post-transplant survival	7-14 years	7-14 years
Case fatality rate (acute illness)	1-9 per 1000	4 per 1000
Probability of chronic infection	0%	5%-8%

Berge et al. *Hepatology*. 2000;31:469.

Fendrick et al. *Arch Pediatr Adolesc Med*. 1999;153:126.

Margolis et al. *JAMA*. 1995;274:120.

# Hepatitis A

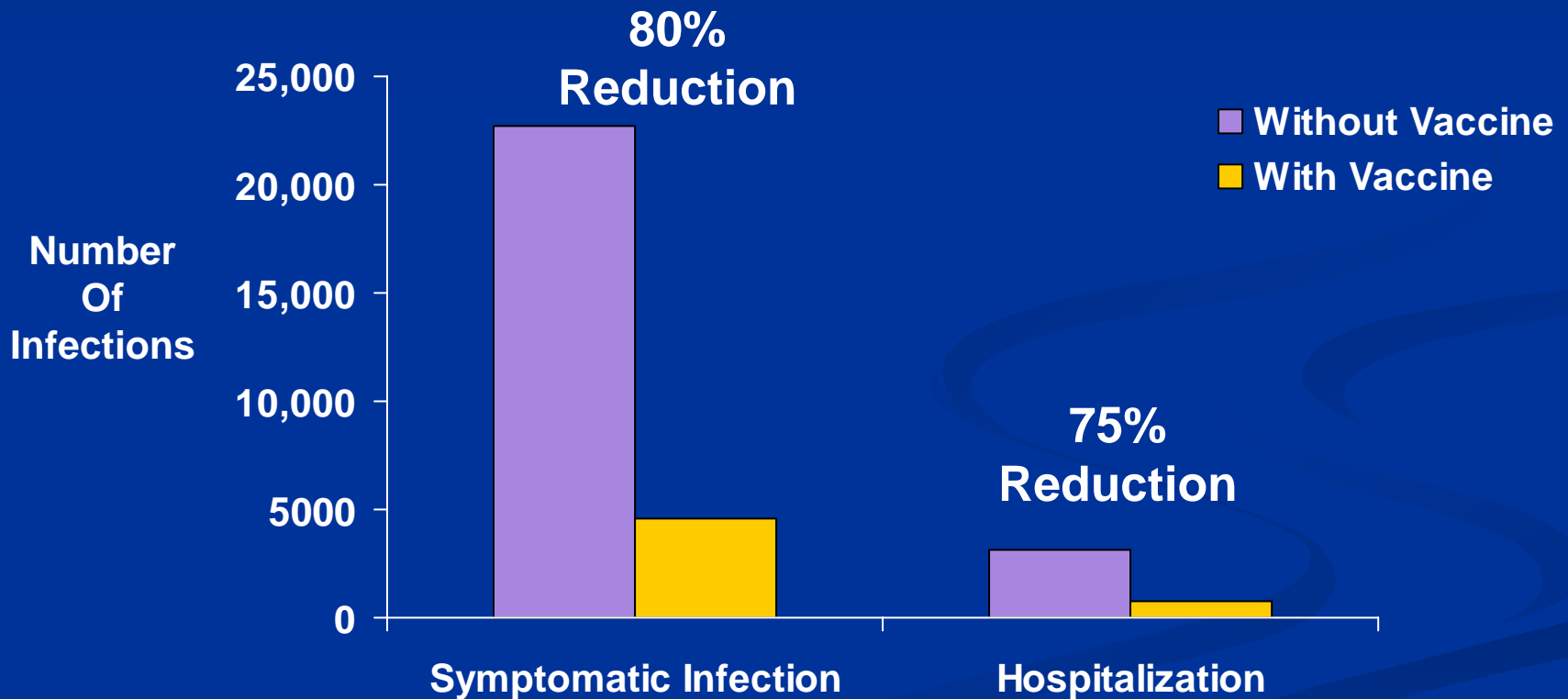
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- On average, infected adults lose 27 days of work<sup>1</sup>
- Between 11% and 22% of patients are hospitalized<sup>1</sup>
- Annual costs of hepatitis A estimated at \$488.8 million<sup>2</sup>
- On average, in the United States, 1 person dies every 4 days as a result of acute liver failure caused by hepatitis A<sup>1</sup>

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1. Centers for Disease Control and Prevention. *MMWR Morb Mortal Wkly Rep.* 1999;48(RR-12):1.  
2. Berge et al. *Hepatology.* 2000;31:469.

# Effect Of Vaccination On Symptomatic Hepatitis A Infections And Hospitalizations 10 States With Highest Hepatitis A Incidence



# Lifetime Risk Of Selected Hepatitis A Outcomes 2-Year-Olds, 11 ACIP States

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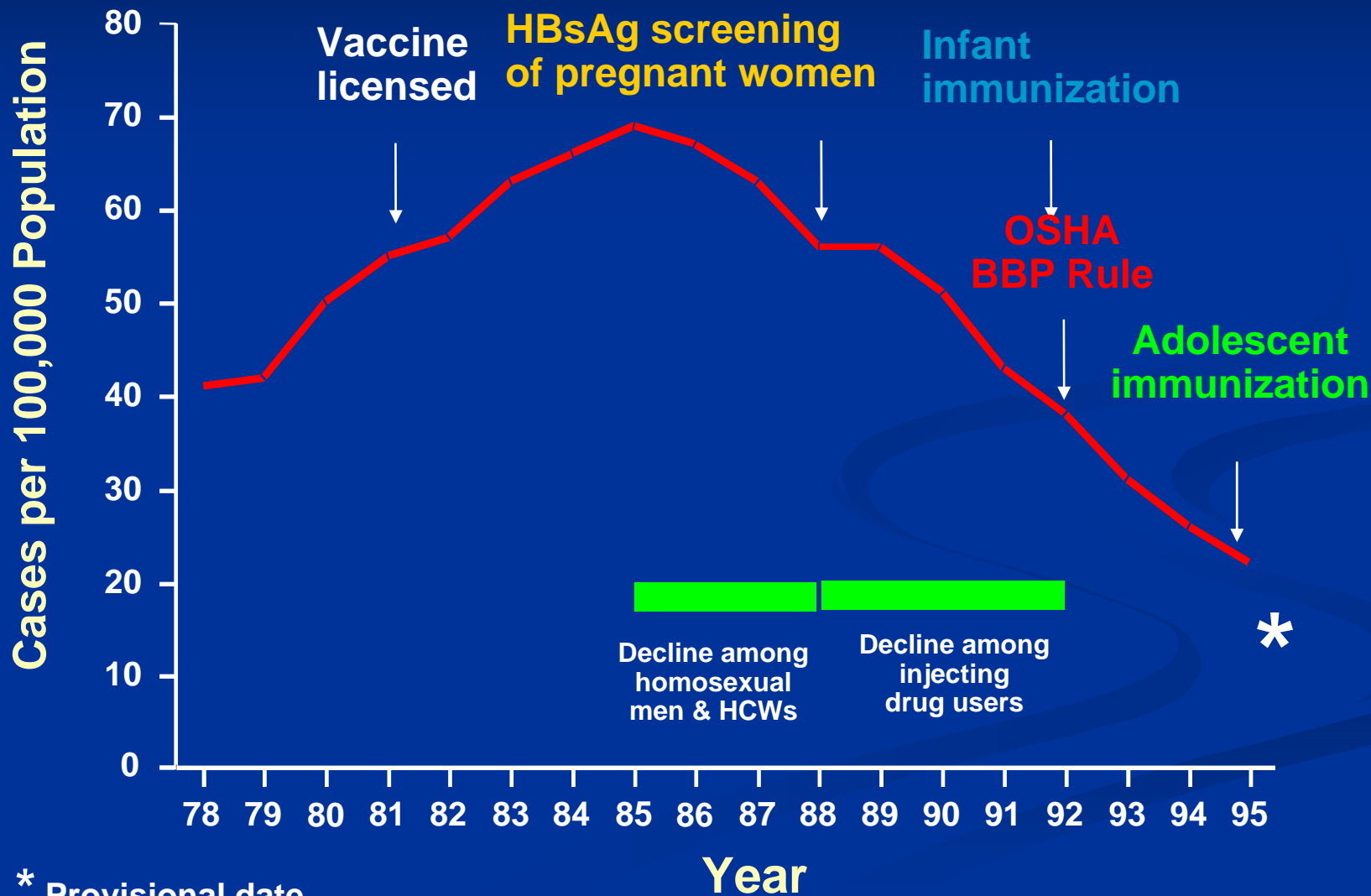
<b>Outcome</b>	<b>No Vaccine</b>	<b>Vaccine</b>
Work loss	2.5/100	0.4/100
Hospitalization	6.5/1000	1.2/1000
Fatal hepatitis A	1.8/10,000	0.5/10,000

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# Hepatitis B Infection and Disease

- Over 200 million carriers worldwide
- Established cause of chronic hepatitis, cirrhosis, hepatocellular carcinomas
  - Second only to tobacco among known human carcinogens
- Disease burden in US
  - ~75000 cases, 5000 deaths

# Estimated Incidence of Acute Hepatitis B, United States, 1978-1995



# Why Vaccinate Adults Against Hepatitis A And B?

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- Infection risks are relatively low, but consequences are often great
  - Many adults will at some time travel to endemic countries (few receive travel vaccines)
  - Efforts to vaccinate high-risk adults (eg, MSM, STD, multiple sex partners) have not been very successful, and a broader vaccination effort would reach many at high risk
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# Benefits Of Childhood Vaccination

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- Parent work loss (due to sick child)
  - Child-to-parent disease transmission
  - Fewer children being infected as adults
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# Varicella

# Childhood Immunization — Varicella

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- Health system costs are modest
  - 32 physician visits per 100 cases
  - 1.6 hospitalizations per 1000 cases (ages 1-15 years)
- Medical cost reduction does not fully offset vaccination costs
  - \$17 versus \$48 per child
- % Of cases for which one parent misses work: 33%-46%
- Work loss duration per case – 3.7 days
- Vaccinees infected as adults miss 5.5 days from work
- Reduced work-loss cost of \$98 per vaccinee is more than twice the cost of vaccination

# Summary - Employer Benefits

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- From adult vaccination
    - reduced medical costs
    - reduced absenteeism
    - reduced turnover
    - increased productivity & morale
  - From childhood vaccination
    - parent work loss (due to sick child)
    - child-to-parent disease transmission
    - fewer children being infected as adults
-

# An ounce of prevention?

- Of the \$1.9 trillion dollars of U.S. healthcare costs
  - 75% is spent on treating preventable chronic illnesses
  - 1% is spent on preventing illness and injury

# Recommendations for Employers

- Offer structured preventive benefits
- Inform about availability and promote use
- Educate about value and importance
- Implement activities and provide opportunities
- Support community and worksite based programs