

# Surveillance for Acute Hepatitis B Infection in the United States: Impact of Universal Hepatitis B Vaccination Program

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# Overview

- Vaccine recommendations and uptake
  - Groups at increased risk
  - Universal vaccination
- National surveillance for acute hepatitis B virus (HBV) infection
- Continuing challenges

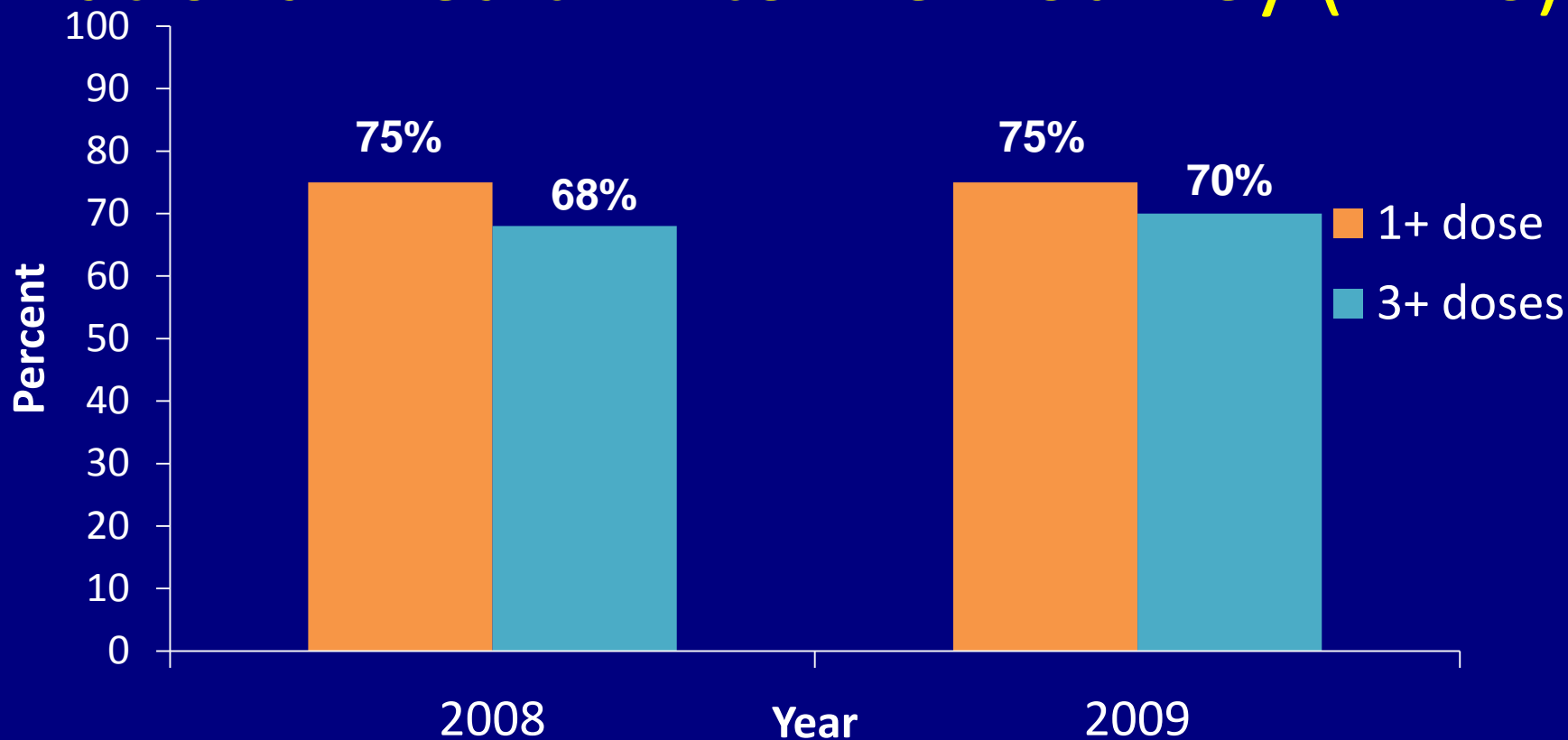
# ACIP Recommendations for Hepatitis B Vaccination in the United States

## *High Risk Groups*

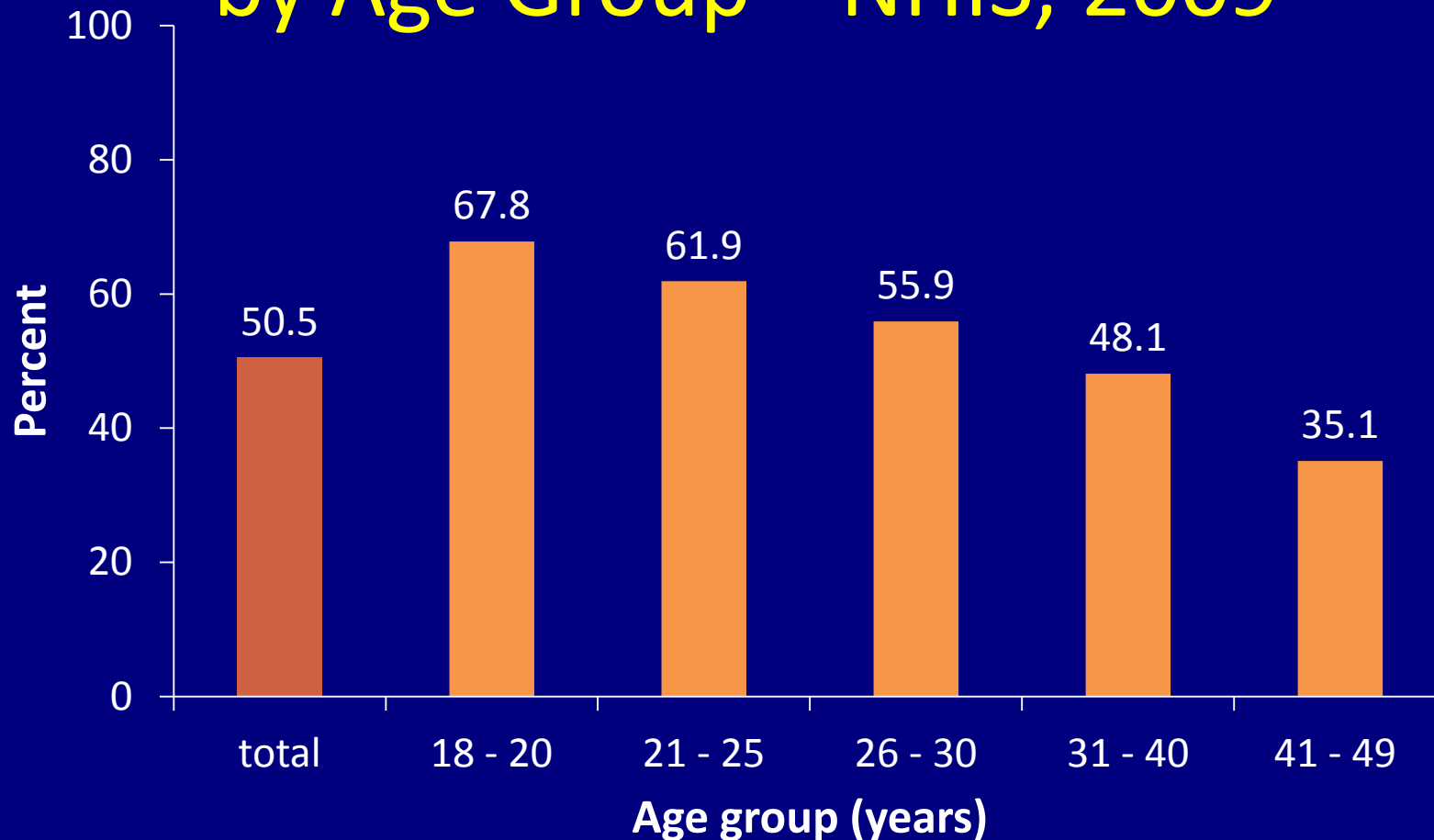
Year	ACIP Recommendations
1982	Groups at high-risk for HBV infection*
1984	Infants born to women with chronic HBV infection
1985	Heterosexual persons with multiple sex partners; international travelers to HBV-endemic areas
1990	Public safety workers exposed to blood; family of adoptees from HBV-endemic areas
2011	Adults with diabetes (provisional)

\*Health-care providers, persons at institutions for the developmentally disabled, MSM, IDUs, clotting factor recipients, hemodialysis patients, household & sexual partners of chronic HBV, populations with high rates of HBV infection, and inmates of long-term correctional facilities. MMWR 2002;

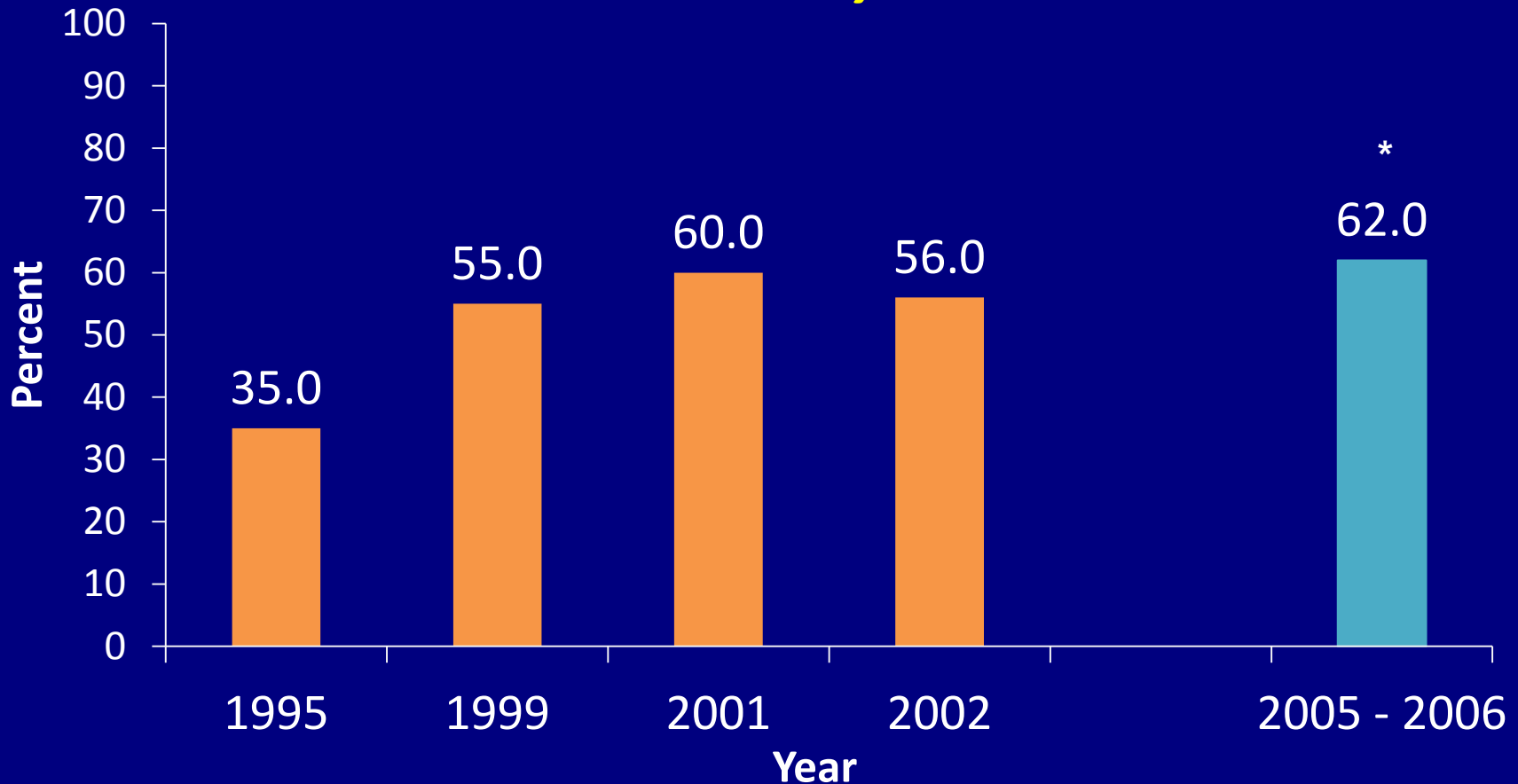
# Hepatitis B Vaccination Coverage among Non-High-Risk *Healthcare Personnel* Ages 18-49 Years, 2008-2009 National Health Interview Survey (NHIS)



# Hepatitis B Vaccination Coverage ( $\geq 1$ dose) among *High-risk Adults* by Age Group—NHIS, 2009



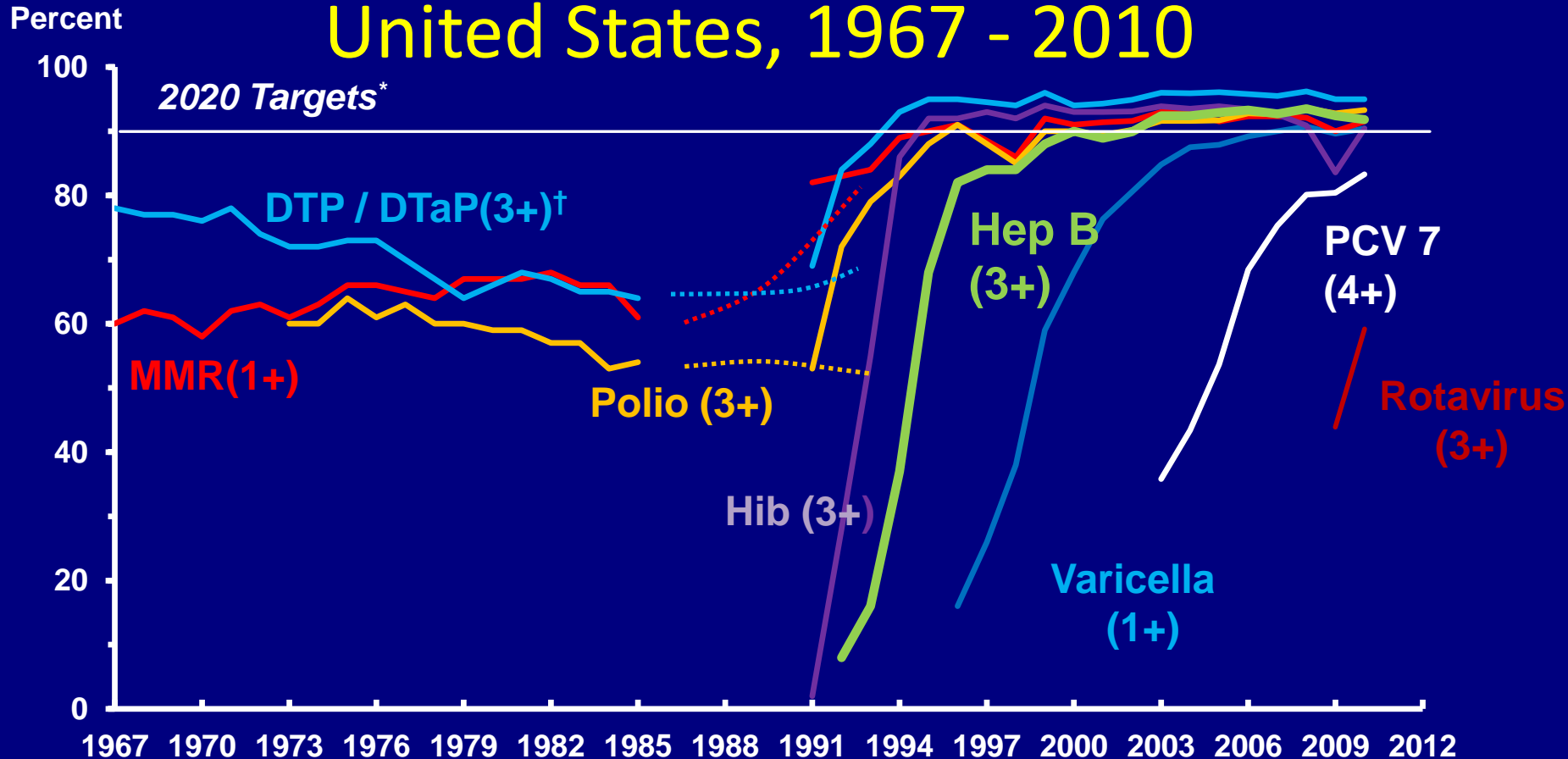
# Hepatitis B Vaccination Coverage ( $\geq 3$ dose) by Selected Years among *Chronic Hemodialysis Patients*



# ACIP Recommendations for *Universal* Hepatitis B Vaccine in the United States

Year	ACIP Recommendations
1991	All US infants (starting at age 0 or 1 month)
1995	All unvaccinated children 11-12 years of age
1999	All unvaccinated children 0-18 years of age
2002	Preferred vaccination starting at birth
2005	Recommend first dose hepatitis B vaccine at “birth” (before hospital discharge; usually <3 days)

# Increasing Vaccine-Specific Coverage Rates Among Preschool-Aged Children United States, 1967 - 2010



† DTP(3+) is not a Healthy People 2010 objective. DTaP(4) is used to assess Healthy People 2010 objectives.

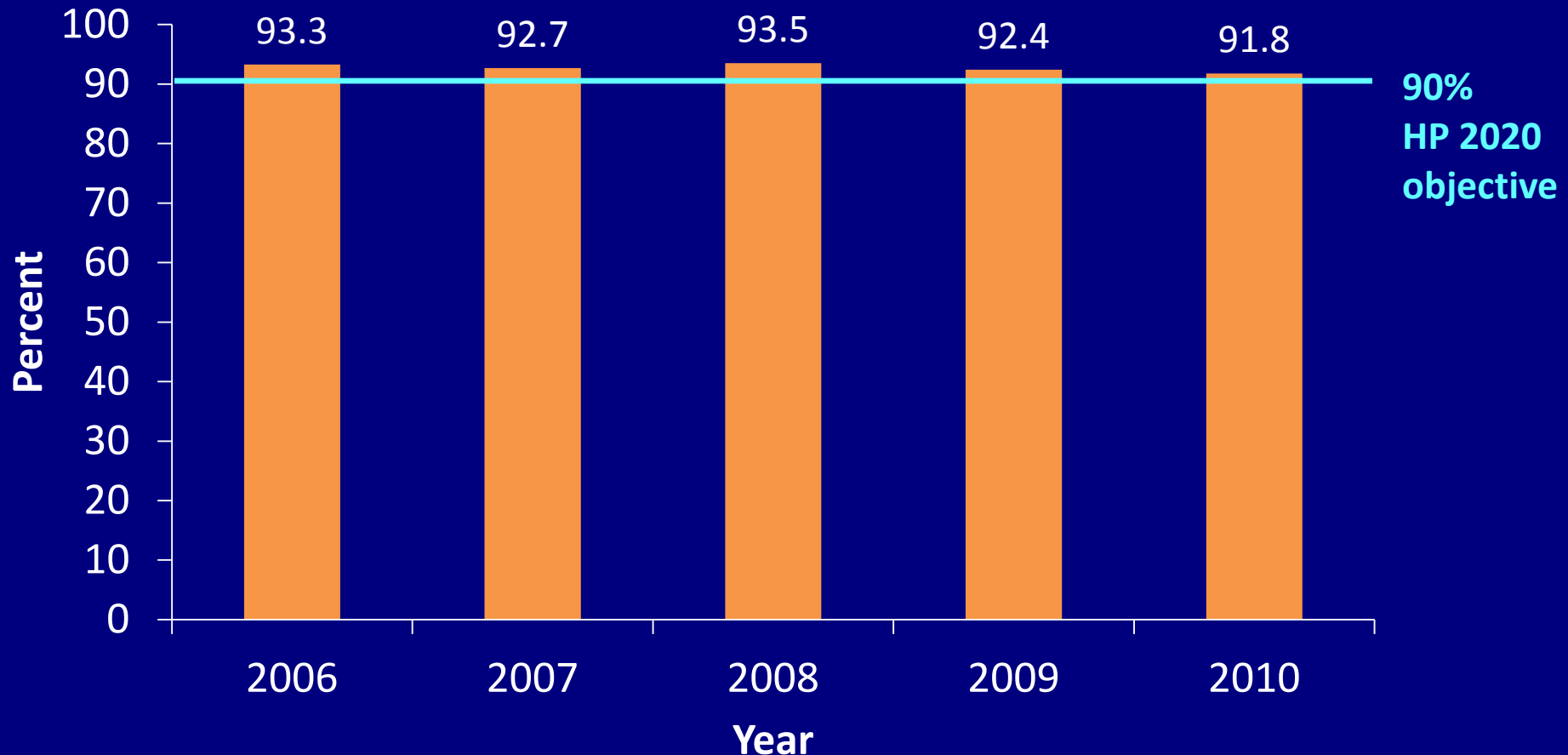
Note: Children in the USIS and NHIS were 24-35 months of age. Children in the NIS were 19-35 months of age.

Source: USIS (1967-1985), NHIS (1991-1993) CDC, NCHS, and NIS (1994-2010), CDC, NIP and NCHS; No data from 1986-1990 due to cancellation of USIS because of budget reductions.

\* Healthy People 2020 targets are 90% except for rotavirus vaccine, which is 80%

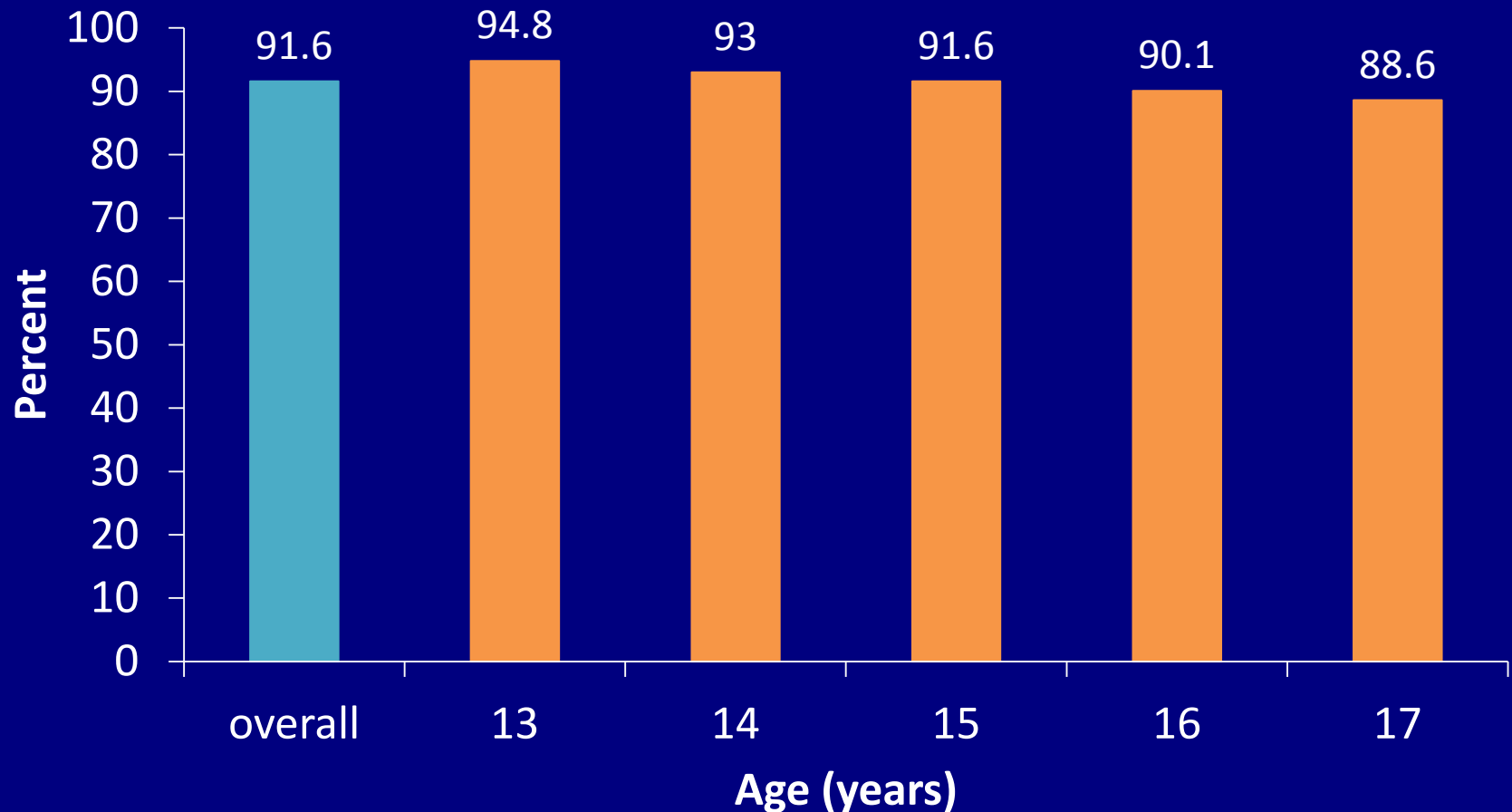


# ≥3-Dose Hepatitis B Vaccination Coverage among Children\* United States, 2006-2010



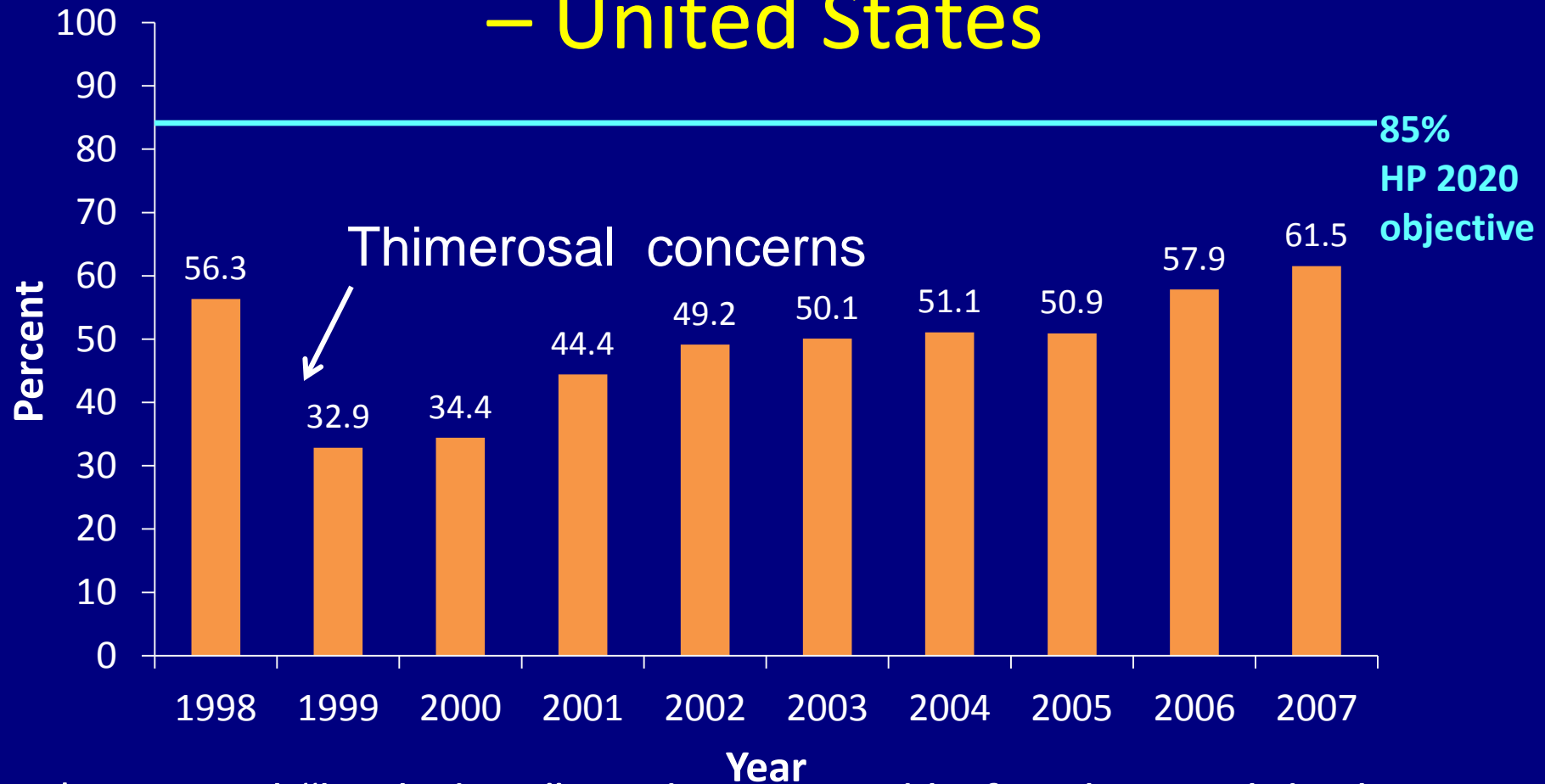
\*Determined at 19-35 months of age. *MMWR*. 2011;60(34):1158.

# Hepatitis B Vaccination Coverage *Adolescents Ages 13-17 Years –* United States, 2010



CDC. *MMWR*. 2011;60(33):1119.

# Uptake of Hepatitis B Vaccine Dose 1 by Age 3 Days\*: 1998-2007 Birth Cohorts – United States



\*Universal “birth dose” is administered before hospital discharge

Zhao Z. *Vaccine* (in press)



# National Notifiable Disease Surveillance System (NNDSS)

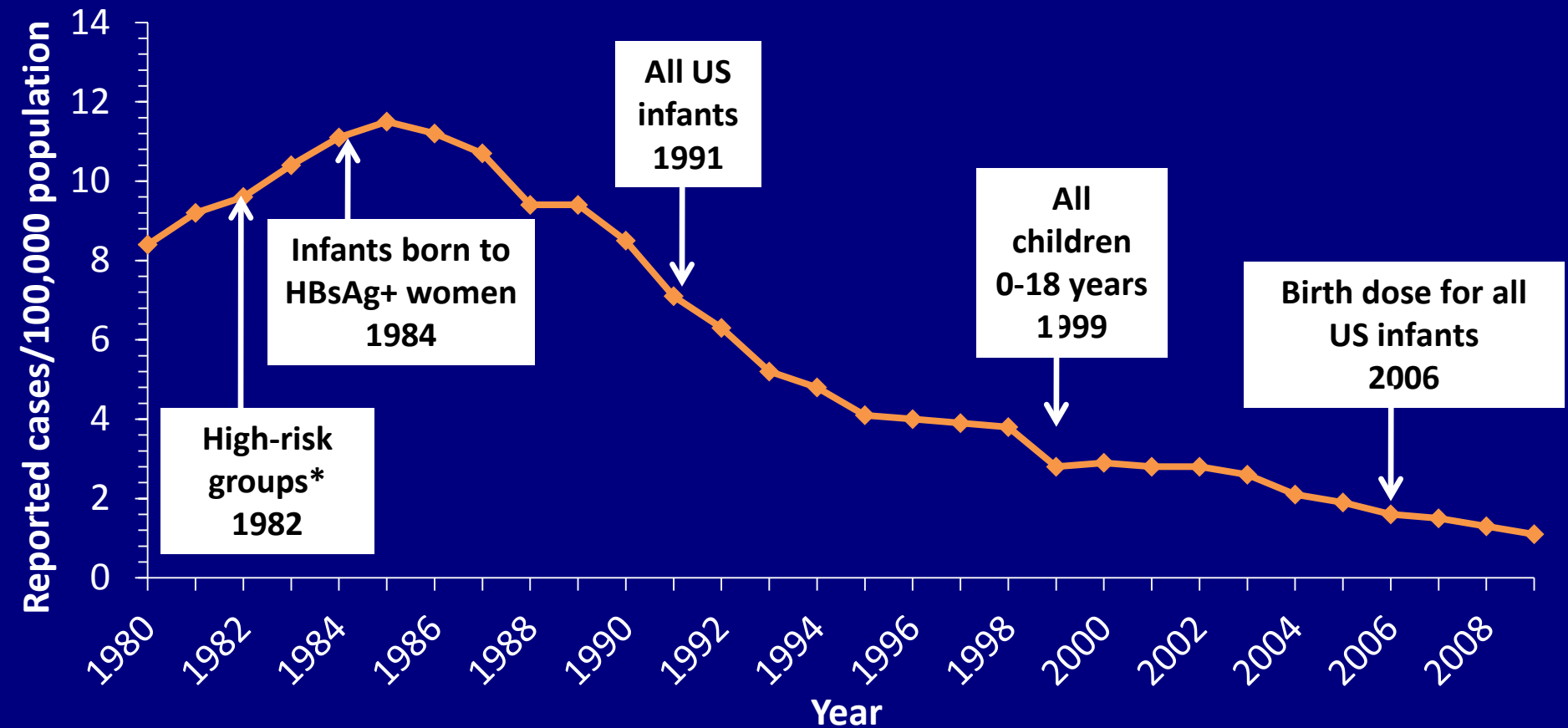
- Voluntary reporting weekly by states and territories
- Electronic reporting since 1990
- Confirmed case defined by the Council of State and Territorial Epidemiologists (CSTE)
  - Acute (symptomatic) hepatitis B infection



# National Notifiable Diseases Surveillance System (NNDSS) Limitations

- Under reporting
- Substantial missing case information  
e.g., risk exposures, vaccination history
- Multiple risk exposures; presumptive  
source of HBV unknown
- [Systems lacking for monitoring chronic  
hepatitis B infection]

# Incidence of Acute Hepatitis B Cases in the United States, 1980–2009

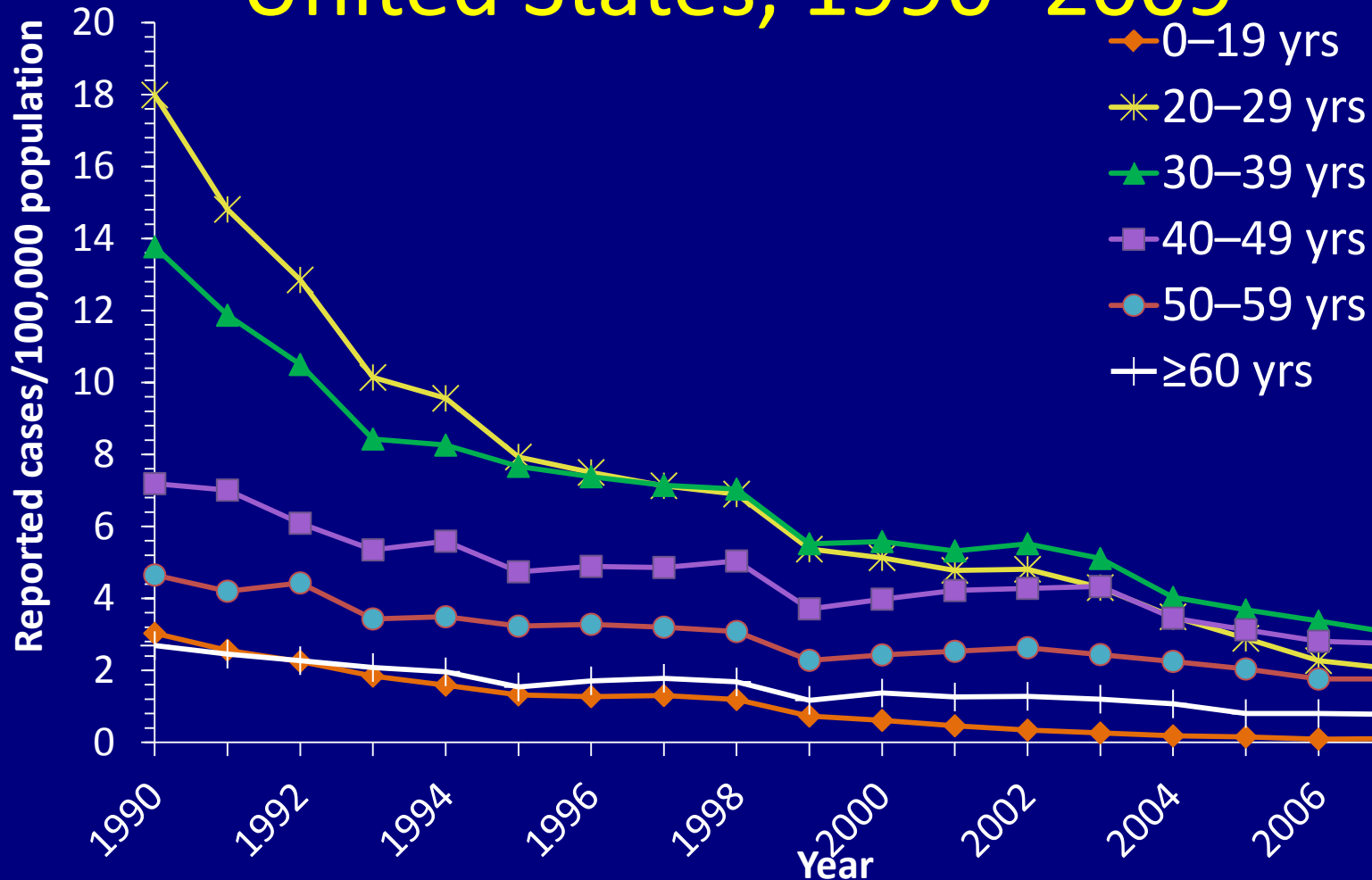


\*Health-care providers, MSM, IDUs, hemodialysis patients, household & sexual partners of persons with chronic HBV, inmates of long-term correctional facilities

# Characteristics of Reported Acute Hepatitis B Virus Infection Cases – United States 2009

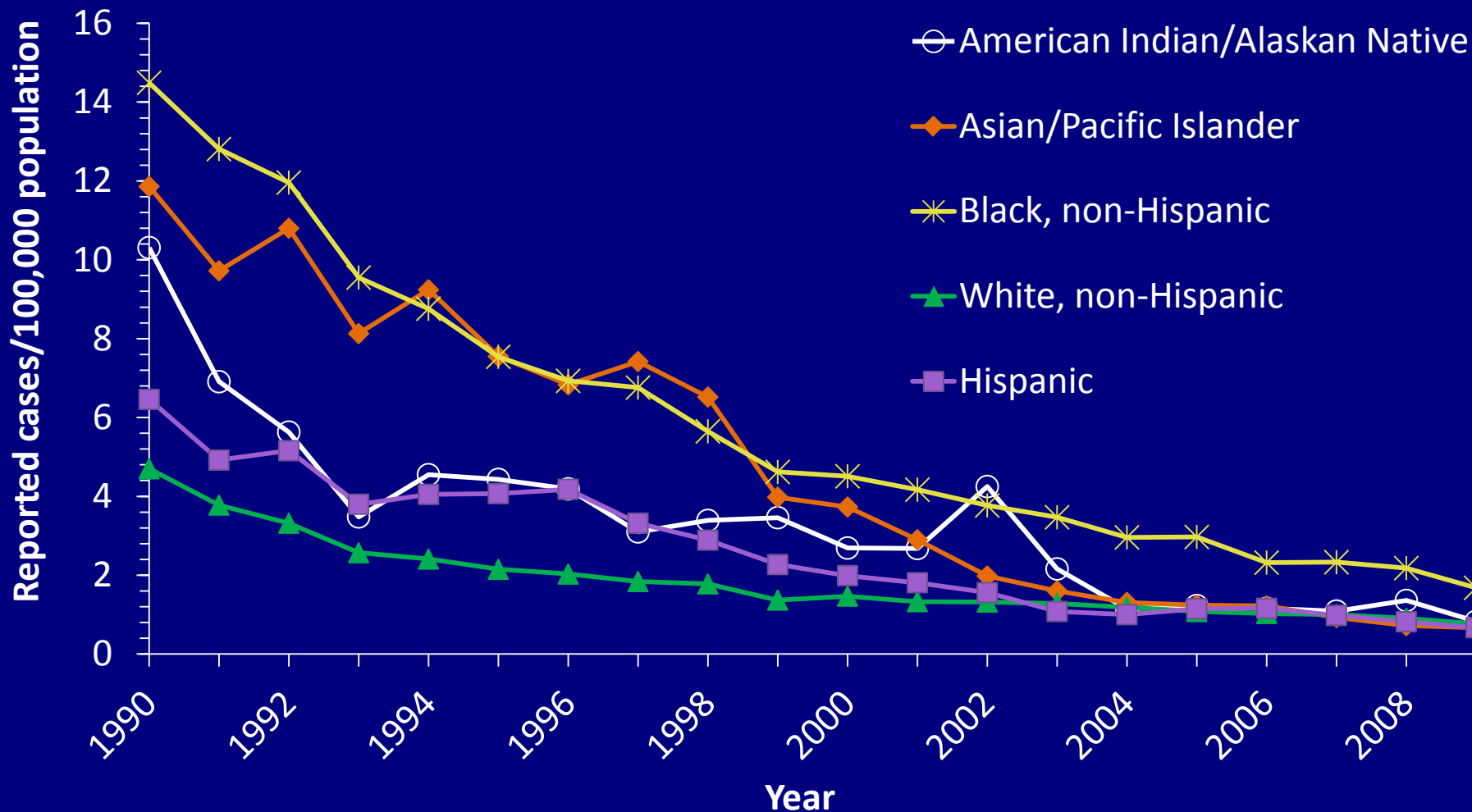
- 3,371 confirmed acute cases
- 46.7% hospitalized
- 1.3% died

# Incidence of Reported Acute Hepatitis B Cases by Age Group — United States, 1990–2009





# Incidence of Reported Acute Hepatitis B by Race/Ethnicity — United States, 1990–2009



Source: National Notifiable Diseases Surveillance System (NNDSS)

# Assessment of Potential Risk Exposures 6 Weeks to 6 Months Prior to Onset of Acute Hepatitis B

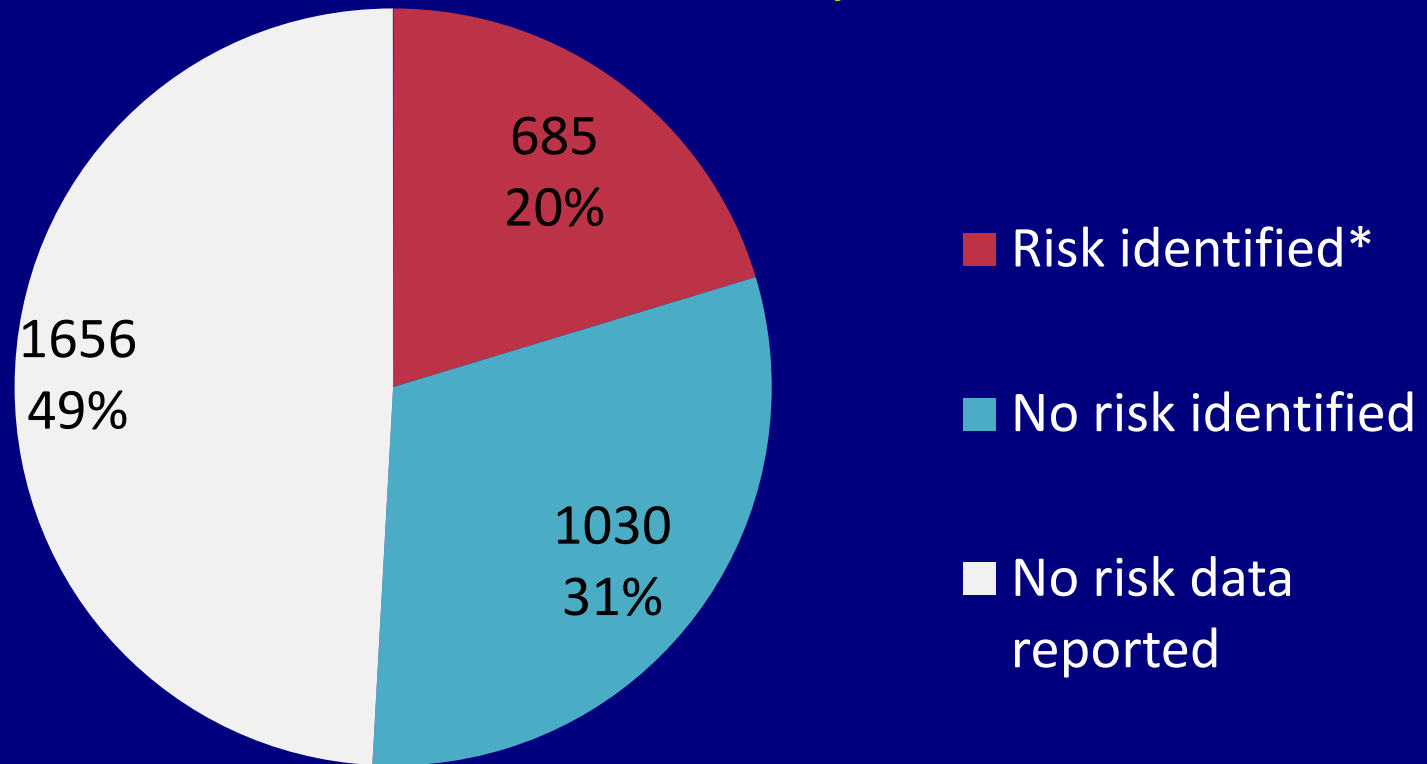
- 1) Using injection drug
- 2) Sexual contact with suspected or confirmed hepatitis B case-patient
- 3) Household contact with suspected or confirmed hepatitis B case
- 4) Man who has sex with men
- 5) Multiple sex partners

# Potential Risks 6 Weeks to 6 Months Prior to Onset of Acute Hepatitis B\*

- 6) Occupational (medical, dental) exposure to blood
- 7) Hemodialysis
- 8) Blood transfusion
- 9) Percutaneous injury
- 10) Surgery
- 11) *New*: diagnosed diabetes

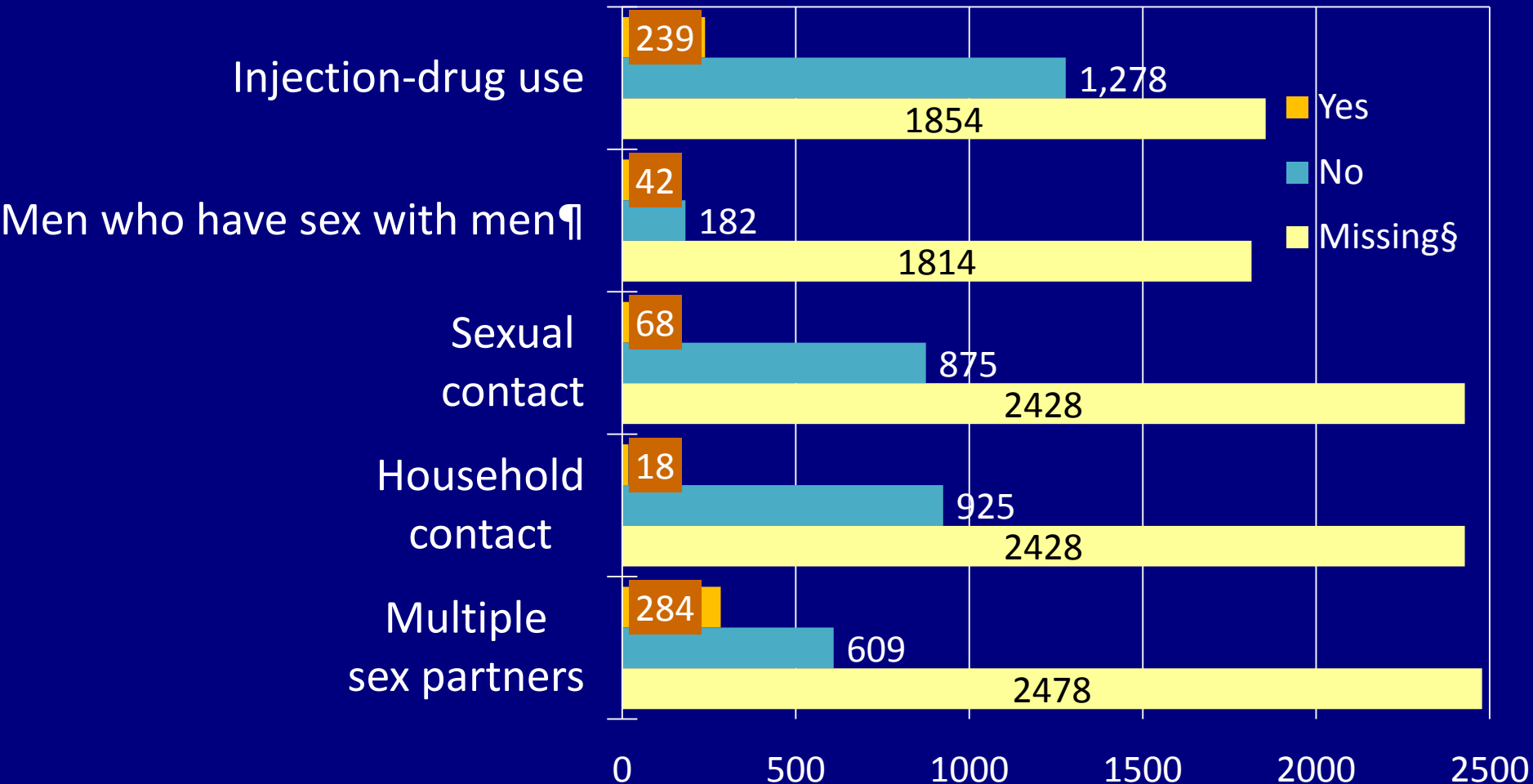
\* Vaccination history lacking

# Distribution of Risk Exposures among Reported Acute Hepatitis B Cases -- United States, 2009



\* Includes case reports indicating the presence of at least one of the following risks 6 weeks to 6 months prior to onset of acute hepatitis B: 1) using injection drugs; 2) having sexual contact with suspected/confirmed hepatitis B case-patient 3) being a man who has sex with men; 4) having multiple sex partners concurrently; 5) having household contact with suspected/confirmed hepatitis B case-patient; 6) occupational exposure to blood; 7) being a hemodialysis patient; 8) having received a blood transfusion; 9) having sustained a percutaneous injury; and 10) having undergone surgery.

# Acute Hepatitis B Reports,\* by Risk Exposure<sup>†</sup> — United States, 2009



\*A total of 3,371 case reports of hepatitis B were received in 2009.

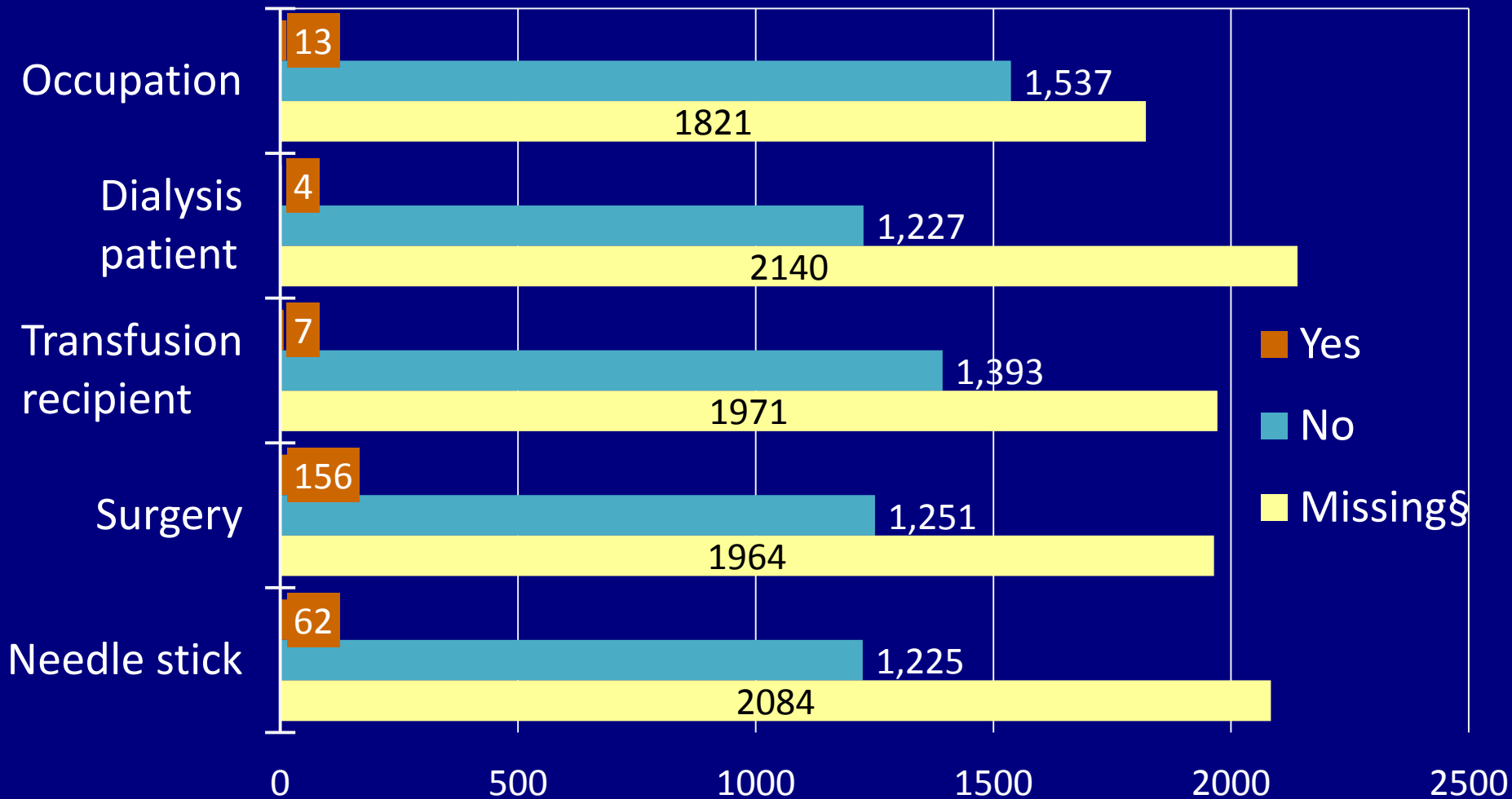
<sup>†</sup> More than one risk behavior may be indicated on each case report.

<sup>§</sup> No risk data reported.

<sup>¶</sup>A total of 2,038 hepatitis B cases were reported among males in 2009.

Source: National Notifiable Diseases Surveillance System (NNDSS)

# Acute Hepatitis B Reports,\* by Risk Exposure<sup>†</sup> — United States, 2009



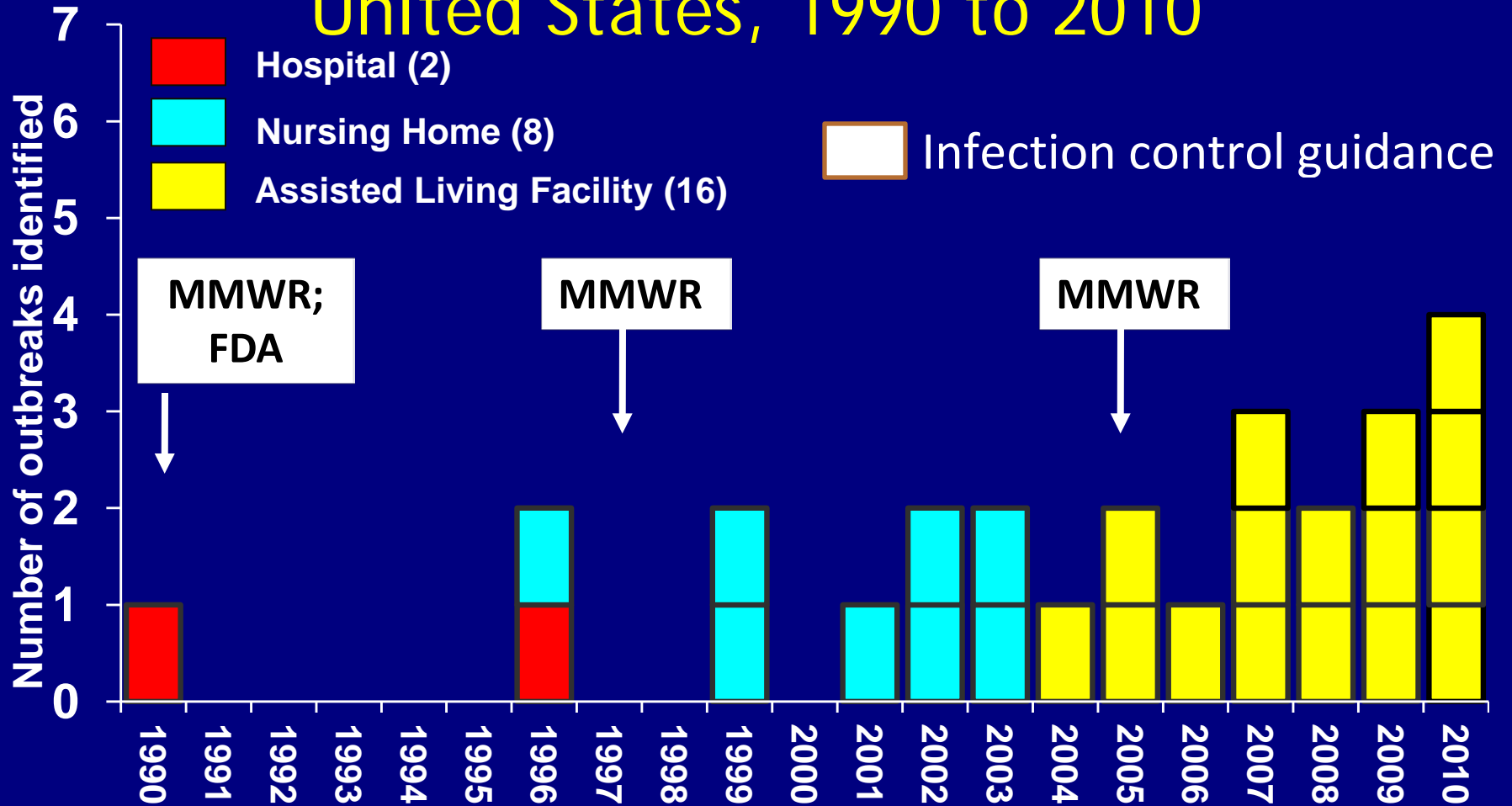
\*A total of 3,371 case reports of hepatitis B were received in 2009.

<sup>†</sup> More than one risk exposure may be indicated on each case report.

<sup>§</sup>Risk data not reported.

Source: National Notifiable Diseases Surveillance System (NNDSS)

# Outbreaks of Hepatitis B Virus Infection associated with Blood Glucose Monitoring United States, 1990 to 2010



Thompson, Perz. *J Diabetes Sci Technol* 2009;3:283-88.  
 CDC unpublished data (2009-10).

# Past Hepatitis B Infection

## NHANES\*, 1999-2010

- Nationally representative survey of *non-institutionalized* adults; tested for antibody to hepatitis B core antigen (anti-HBc)
- Unadjusted prevalence of anti-HBc among adults with diabetes (vs. without diabetes)
  - Overall, 60% increase ( $p < 0.001$ )
  - Ages 18-59 years, 70% increase ( $p < 0.001$ )
  - Ages  $\geq 60$  years, 30% increase ( $p = 0.032$ )

\*NHANES = National Health and Nutrition Examination Survey (CDC unpublished data, 2011)



# Acute Hepatitis B Disease among Adults with Diabetes in 8 Surveillance Sites, 2009-2010

- Adults with diagnosed diabetes without “Other” hepatitis B risk factors†
  - Ages <60 years, 2X higher odds of hepatitis B
  - Ages ≥60 years, 1.5X higher odds of hepatitis B\*

†“Other” risk factors included injecting drug use, men who have sex with men, and HIV risk associated behaviors.

\*Not statistically significant (small sample size)



# Challenges for Acute Hepatitis B Surveillance

- Define sources of HBV infection
- Assess vaccine status among cases
- Understand effects of changing patterns of disease transmission
  - Is the focus of public health effort appropriate?

# Summary

- Declines in acute hepatitis B virus infection
  - >98% among children and adolescents
  - Decrease in disparities by race/ethnicity
  - Smallest declines among adults  $\geq 40$  years
- Surveillance for vaccination among acute cases needed to monitor for long-lasting protection

# Acknowledgements

- Division Viral Hepatitis, NCHHSTP CDC
  - Epidemiology and Surveillance Branch - Scott Holmberg, Ruth Jiles, Monina Klevens, and the Surveillance Team
  - Vaccine Unit – Sarah Schillie, Emily Smith, Tanja Walker, Meredith Reilly
  - Prevention Branch-Geoffrey Beckett, Kathy Byrd
- States and jurisdictions reporting to National Notifiable Diseases Surveillance System, and Emerging Infections Program Sites

Thank you

# Additional Slides

# Acute Hepatitis B Confirmed Case Definition– United States

- A confirmed case meets the clinical case definition, is laboratory confirmed, and is not known to have chronic hepatitis B virus infection

# Acute Hepatitis B Case Definition- United States

- Clinical case definition
  - Acute illness with discrete onset of symptoms **and** jaundice or serum ALT levels >200 IU/L
- Laboratory criteria
  - IgM antibody to hepatitis B core antigen (anti-HBc) positive
  - *or* hepatitis B surface antigen (HBsAg) positive
  - *and* IgM anti-HAV negative (if done)