

Impact of Immunization Initiatives on Acute Hepatitis B Incidence in North Carolina (1991-2005)

Prepared by Patricia Poole, RN, Hepatitis B Coordinator, NC Immunization Branch, and Jean-Marie Maillard, MD, MSc, Medical Epidemiologist, General Communicable Disease Control Branch.

After reporting on the NC Perinatal Hepatitis B Prevention Program for the 2003 birth cohort in the preceding issue of EpiNotes, this article focuses on the long term benefits of hepatitis B control activities in North Carolina. Perinatal cases are not included in this analysis.

Hepatitis B is a common viral infection that can be acute or chronic. It is transmitted by mucosal or percutaneous exposure to the hepatitis B virus (HBV). In the U.S., most cases are the result of sexual transmission. Other risk categories include intravenous transmission through sharing needles and syringes for injection of illicit drugs, the second most frequent risk although far below sexual transmission, and household contact with a case, occupational transmission among unvaccinated health professionals, hemodialysis and blood transfusion. These last four categories account for only a small fraction of reported cases. HBV infection can also be transmitted vertically from an infected mother to her child in the perinatal period, in most cases during a chronic stage of infection which may or may not be known to the mother. This mode of transmission is becoming rare in the U.S. Infection is documented by detection of hepatitis B surface antigen (HBsAg) in the blood.

Prior to routine childhood hepatitis B vaccination, approximately 80% of acute infections in the U.S. occurred among adults, 8% among adolescents, 4% among children and 4% among infants. Approximately 10% of newly infected adolescents and adults fail to clear the infection, and develop chronic, lifelong infections. In contrast, 90% of babies infected in the perinatal period remain chronically infected, and this group represents a disproportionate 24% of all chronic infections. Chronic HBV results in complications such as chronic hepatitis, fibrosis, cirrhosis, and liver cancer.¹

The incidence of acute hepatitis B virus (HBV) infections in the United States peaked in the mid-1980's at approximately 250,000-300,000 cases per year.^{1,2} Of these, an estimated 24,000 cases occurred annually in infants and children.¹ After licensing of a safe and effective vaccine in 1982, initial disease prevention strategies targeted high-risk adults. Early strategies to identify and vaccinate only high-risk adults did not make a significant impact on HBV incidence. In 1991, 1995, and 1999 respectively, CDC added routine HBV immunization of infants born to infected women, adolescents and all children 0-18 years

¹ CDC. Epidemiology and Prevention of Vaccine-Preventable Diseases (Pink Book), 2005, 191-212.

² Shepard CW, Finelli L, Fiore AE, and Bell BP. Epidemiology of Hepatitis B and Hepatitis Virus Infection in United States Children, *Pediatric Infectious Disease Journal*, 2005;24:755-760.

old to the national strategy for HBV disease prevention. Recent state and national data reflect the effectiveness of these hepatitis B immunization programs.

North Carolina is in compliance with this national strategy, and in fact, the state's HBV prevention program preceded these recommendations. Since 1990, state law requires post-exposure immunoprophylaxis for infants born to HBsAg-positive women, and in 1994, North Carolina became a "universal" state, providing hepatitis B vaccine to all children at no cost. Additionally, state immunization law requires the hepatitis B vaccination series at birth for all children born since July 1, 1994. Because of the lag time before this intervention would provide results, e.g., when risk behavior would not result in HBV infection in persons immunized at birth, North Carolina launched in 1995 a statewide initiative to offer hepatitis B vaccinations to susceptible sixth-graders in school-site clinics. This would provide protection prior to the age of greatest risk of exposure to HBV.

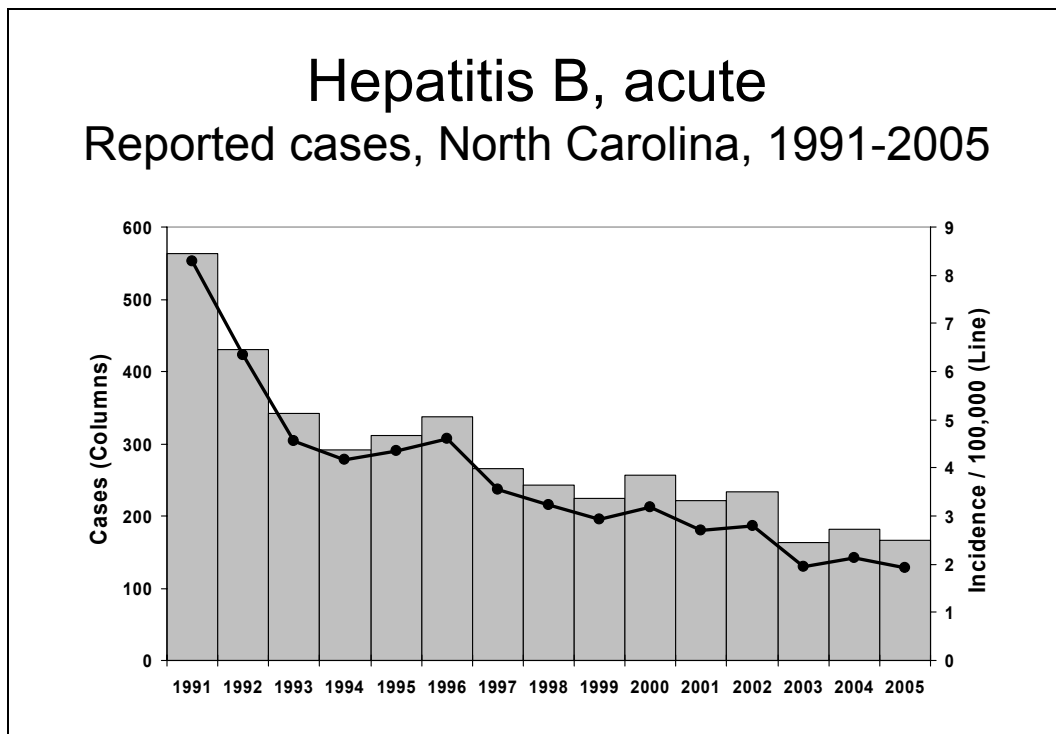


Figure 1

While acute HBV infections may be asymptomatic, in particular among children, a steady surveillance system can provide an indirect measure of the effectiveness of prevention efforts. In the 15 years between 1991 and 2005, the overall reported incidence rate fell from 8.3 to 1.92 per 100,000 population, a 77% decline. (Figure 1.) The greatest reduction was among the younger cases, with reported incidence rates going from 3.88 down to 0.34 per 100,000 population aged 0 to 19 years, a 91% decline, and from 9.99 down to 2.52 for cases aged 20 years or older, a 75% decline. (Figure 2.)

Hepatitis B, acute – North Carolina, 1991-2005 Incidence rate by Age Group

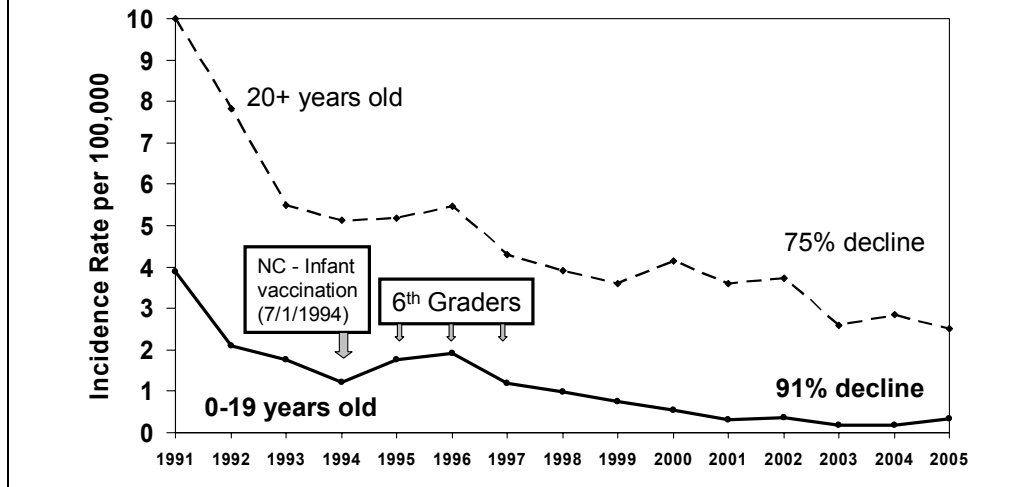


Figure 2

Immunization efforts have successfully reduced acute HBV infection in North Carolina. The full benefit of this lower incidence of acute hepatitis B, however, will result from reduced chronic liver infection, and also fewer births occurring among chronically infected pregnant women. Complications, such as cirrhosis and hepatocellular carcinoma are usually diagnosed after decades of HBV infection. The full effect of reduced number of acute HBV infections will become more evident as vaccinated infants and children reach advanced ages. The public health benefit of this immunization program will bring immeasurable dividends for years to come.

For more information about the North Carolina Hepatitis B Prevention Program, contact: Patricia Poole, R.N., North Carolina Immunization Branch, at 919.707.5573.