

# Hepatitis B Screening in a New York City Obstetrics Service

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**Abstract:** A cross-sectional chart review study was performed of hepatitis B virus (HBV) surface antigen screening of 532 women admitted to a New York City hospital obstetrics service from 1984 to 1985. Comparison of serologic results to risk factors for hepatitis B revealed that women born outside the United States and those with a positive test for or history of a sexually transmitted disease were more likely to be infected with HBV. Obstetric clinics with large immigrant populations should consider screening all patients for HBV. (*Am J Public Health* 1988;78:308-310.)

## Introduction

Hepatitis B virus (HBV) is a major cause of fulminant and chronic hepatitis, cirrhosis, and hepatocellular carcinoma worldwide.<sup>1-3</sup> Perinatal transmission from mother to newborn is highly efficient, and up to 90 per cent of babies born to hepatitis B "e" antigen carrier mothers become carriers themselves.<sup>4-6</sup> Babies not infected at birth remain at risk for infection from the mother or older siblings. Perinatal, postnatal, or preschool infection usually results in asymptomatic but often chronic infection.<sup>7</sup>

Several clinical trials have demonstrated that the combination of hepatitis B immune globulin administered within 24 hours of delivery and hepatitis B vaccine given within a week of birth is up to 90 per cent effective in preventing spread to the baby and interrupting the cycle of transmission to current and future generations.<sup>8-10</sup>

Prevalence of HBV carriage varies geographically. Generally infection occurs at an earlier age in those countries with the highest prevalence, particularly those in Southeast Asia, Sub-Saharan Africa, and areas of South and Central America and the Caribbean.<sup>11</sup>

In New York City, hepatitis B is the most commonly reported communicable disease that is immunizable. Acute, symptomatic infection is most often reported in individuals 15 to 39 years old. Approximately one-third of individuals reported in this age group are women. Although the prevalence of HBV carriage among pregnant women in New York City has not been studied, birth certificate data are available on the country of birth of the mother. In 1986, there were 50,748 births (45 per cent of total births) to New York City women born outside the United States (Table 1). Of these, approximately 96 per cent were to women born in areas or countries with an intermediate or high prevalence of HBV carriage (between 3 per cent and 15 per cent) in adults.<sup>11</sup>

Women belonging to other groups at increased risk of HBV carriage (intravenous drug abusers, health care workers, and women with multiple sex partners) are also well represented in New York City (Table 1). In 1986, use of

TABLE 1—Live Births to Mothers at Increased Risk for HBsAg Positivity, 1986

	Number of Births	Estimated HBsAg Positivity	Estimated Number of Babies at Risk
		%	
High prevalence immigrant mothers: Far East and Southeast Asia, Sub-Saharan Africa	6530	6-13	653
Intermediate prevalence immigrant mothers: (South and Central American, Haiti, Dominican Republic, other Caribbean Islands, Middle East, Eastern and Southern Europe)	42282	3-5	1691
Births to US-born mothers using narcotics	1718	7	120
Total	50530		2464

narcotics was noted in the mothers in 2,038 birth certificates; this information is underreported.

Obstetric centers are faced with deciding whether to screen all deliveries or only deliveries to women with a risk factor for HBV carriage. We present the findings of a center which has chosen to screen all service admissions.

## Methods

Since 1984, the policy of the Columbia Presbyterian Medical Center has been to test all Obstetrics Service patients for hepatitis B surface antigen (HBsAg) at the first prenatal visit. The method of serum analysis is radio-immunoassay. When results are positive, the serum is tested for hepatitis B "e" antigen (HBeAg), antibody to HBsAg (anti-HBs) and antibody to HBeAg (anti-HBe). During the period from June 1984 to July 1985, there were approximately 3,000 live births at the Columbia Presbyterian Medical Center. About 60 per cent of the mothers were service cases: their methods of payment were Medicaid (68 per cent), third party and other payment methods (28 per cent), and self-pay (4 per cent).

Consecutively numbered charts of approximately 1,000 pregnant women who registered between June 1984 and July 1985 were examined; charts were required to include a prenatal examination with medical history, sociodemographic information, and laboratory data. Information abstracted included the woman's age, race, place of birth, occupation, educational level, history of hepatitis, intravenous drug use, receipt of blood transfusions, history or laboratory evidence of a sexually transmitted disease (STD), and results of hepatitis serology. The hospital chart "asks" and organizes this information in a standard format so as to minimize differences between interviewers. If the HBsAg status or other laboratory information was missing in the patient's chart, the laboratory computer terminal was used to locate the information. Statistical analysis included use of a chi-square or Fisher's exact test and calculation of odds ratios with associated 95 per cent confidence intervals using

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**TABLE 2—Demographic Data, Columbia Presbyterian Maternity Service, 1984–85: Hepatitis B Antigen Seropositivity and Birthplace**

Mother's Place of Birth	Frequency	HBsAg (%)	HBsAg & HBeAg (%)
Dominican Republic	237	11 (4.6)	4 (1.7)
Haiti	3	1 (33.3)	1 (33.3)
Other Caribbean Islands	15	0	0
South & Central America	24	3 (12.5)	1 (4.2)
Africa	3	0	0
Asia and Middle East	6	2 (33.3)	0
United States of America	184	1 (0.5)	0

the method of Cornfield,<sup>12</sup> univariate regression and a logistic regression model.<sup>13</sup>

### Results

Of the 1,000 charts reviewed, 532 were considered acceptable for analysis. The remaining 468 charts were of women who were newly registered and lacked demographic and laboratory data. HBsAg test results were located for 505 (94.9 per cent) of the 532 women included in the study. Nineteen women were positive for HBsAg (3.5 per cent), and six (1 per cent) had both HBsAg and HBeAg. Tables 2, 3, and 4 show the prevalence of HBsAg and HBeAg according to the mother's place of birth, age, and history of STD.

Nearly half (46.9 per cent) of the women tested were born in the Dominican Republic. There were 53 women listed as being of Puerto Rican ethnicity; they are included under born in USA; none was HBsAg positive.

The mean age of the population was 26, range 14–44 years. Among the women born outside the United States, 6.8 per cent of the 205 women less than 30 years old were HBsAg positive compared to 3.6 per cent of 84 such women 30 years of age or older (OR = 2.0, 95% CI = .51, 8.9).

We noted STDs in 10 per cent of women in our study group (Table 4) and these were more likely to be HBsAg positive (OR = 7.8, 95% CI = 2.7, 22.6). Among foreign-born women, 27 per cent of 26 women with a history of STD were positive compared to 3.8 per cent of 261 women without this history (OR = 9.2, 95% CI = 2.8, 30.5).

Information on mother's educational level was available for 394 women. Data on HBsAg status were found for 376 (95 per cent), of whom 81 per cent had completed at least a high school education. We found no association between mother's education level and HBsAg positivity.

To further examine for possible predictors of seropositivity, each of the abstracted factors was separately regressed on seropositivity in a univariate mode. Nativity outside the United States and history or current evidence of an STD were positively associated with seropositivity, while age was negatively associated. The other factors showed little asso-

**TABLE 3—Demographic Data, Columbia Presbyterian Maternity Service, 1984–85: Hepatitis B Antigen Seropositivity and Age**

Age (years)	Frequency	HBsAg (%)	HBsAg & HBeAg (%)
10–14	4	1 (25.0)	1 (25.0)
15–19	61	3 (4.9)	0
20–24	160	6 (3.8)	1 (0.6)
25–29	148	6 (4.1)	3 (2.0)
30–34	86	1 (1.2)	0
35–39	38	2 (5.3)	1 (2.6)
40–44	8	0	0

**TABLE 4—Hepatitis B Antigen Seropositivity and Evidence or History of STD, Columbia Presbyterian Obstetrics Service, 1984–85**

STD History	Frequency	HBsAg+ (%)	HBsAg+ & +HBeAg (%)
Gonorrhea	30	6 (20.0)	3 (10.0)
Syphilis	8	2 (25.0)	1 (12.5)
Syphilis & Gonorrhea	1	0	0
Genital Herpes	8	0	0
Genital Chlamydiosis	2	0	0
None	453	11 (2.4)	2 (0.4)

ciation with seropositivity and were not included in further analyses.

Next a logistic regression was performed to determine the effects of each predictor and all possible interaction terms while controlling for the effects of other factors. None of the interaction terms contributed meaningfully to the model, and they were removed from further analysis. In the reduced model, using as a reference group US-born women less than 30 years of age with no history or evidence of an STD, both birthplace outside the United States and STD (but not age) were independent predictors of HBsAg seropositivity (Table 5). The odds ratios in the logistic regression model are corrected for the effects of the other factors and are therefore not equal to the crude odds ratios cited above.

### Discussion

About half of the charts reviewed were accepted for study. However, since the primary reason for chart rejection was that the mother was newly registered and data had not yet been collected at the time of our review, the patient sample was representative of the obstetric population. In our study population, two factors (history or current evidence of an STD, and birthplace outside the United States) were associated with HBsAg positivity. The high prevalence in Dominican immigrant women in the United States (4.4 per cent) is consistent with surveys in the Dominican Republic.<sup>14</sup>

The high prevalence of HBV antigenemia in women with a history of STDs has been noted in other populations.<sup>15</sup> The correlation between history of STDs and HBsAg positivity suggests that, in this population, sexual spread may be an important route of transmission.

Perinatal transmission of HBV from mother to baby is usually preventable. Screening of mothers likely to be infected with the HBV to identify those carrying the virus is one method of identifying babies in need of prophylaxis. However, in our study population, nine of 19 (47 per cent) HBsAg positive mothers had no notation of the risk factors listed by the Centers for Disease Control's Immunization Practices Advisory Committee (ACIP).<sup>11</sup> Of these nine, two were HBeAg positive and probably would have had HBV carrier babies. It is possible that a more detailed history would have identified a risk factor in these women. Considering birthplace in South or Central America or a Caribbean Island as

**TABLE 5—Logistic Regression Model Relating Seropositivity in Mothers to Risk Factors, Columbia Presbyterian Obstetrics Service, 1984–85**

Factor	Estimate	Odds Ratio	Lower 95%	Upper 95%
Birthplace	1.283	3.61	1.30	10.04
STD	1.150	3.16	1.87	5.32

a risk factor, as suggested by Snyderman,<sup>16</sup> would have identified 18 of the 19 positive women.

Given the findings of 3.5 per cent HBsAg positivity overall and 5.6 per cent positivity in women born outside the United States, the Hospital is continuing to screen all service patients. The list of risk factors for hepatitis B infection is long, and a stigma is attached to factors such as a history of intravenous drug abuse or STD. It is likely that obstetric facilities that test only those women noted to have a risk factor will miss carriers, especially in busy clinics or when a language barrier exists. When the prevalence of HBsAg seropositivity in pregnant women is 1 per cent or more, the facility should consider screening all women. We recommend that other hospitals review the composition of their obstetric population and consider screening widely.

The perinatal and pediatric services must also review their effectiveness in administering a complete preventive series to each baby born to an HBV-infected mother. A hepatitis B prevention program can be successful only when it has administered preventive therapy to all the babies identified to be at risk by the maternal testing program.

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### Deadline for APHA Annual Meeting Abstracts is March 11, 1988

The deadline for submission of abstracts for the 116th annual meeting of the American Public Health Association, to be held in Boston, Massachusetts November 13-17, 1988, is **March 11, 1988** (*not February 12* as printed on the abstract form published in the January 1988 Journal).

Glitches occur some times. The abstract form (pages 89-90) was reprinted from last year's annual meeting announcement, but the deadline was *not* corrected.

Readers are reminded that the call for abstracts for the annual meeting, as well as a list of representatives designated to receive abstracts, appeared in both the January Journal (pages 87-88), and in the December 1987 issue of *The Nation's Health*.