Outcomes of Infants Born to Women Infected with Hepatitis B and Characteristics of Pregnant Women with Hepatitis B Virus Infection in 5 U.S. Public Health Jurisdictions, 2008-2012

Presented by: Noele Nelson, MD, PhD, MPH

Prepared by: Sarah Schillie, MD, MPH, MBA

Viral Hepatitis Prevention Board
Vienna, Austria

1 June 2017

U.S. Perinatal Hepatitis B Prevention Program

- Established in 1990
- Funded in CDC Immunization Cooperative Agreements
- Programs in 64 jurisdictions
  - 50 states
  - 6 cities
  - 5 territories
  - 3 freely associated island nations
- Collaborative effort between CDC's Immunization Services Division and Division of Viral Hepatitis
- Required program objectives based on Advisory Committee on Immunization Practices (ACIP) recommendations

Enhanced Perinatal Hepatitis B Prevention Project

- Additional CDC funding to 5 Perinatal Hepatitis B Prevention Program jurisdictions, 2008-2012
  - Florida
  - Michigan
  - Minnesota
  - New York City
  - Texas
- Data collected to characterize HBsAg-positive pregnant women and assess infant outcomes

Maternal Characteristics

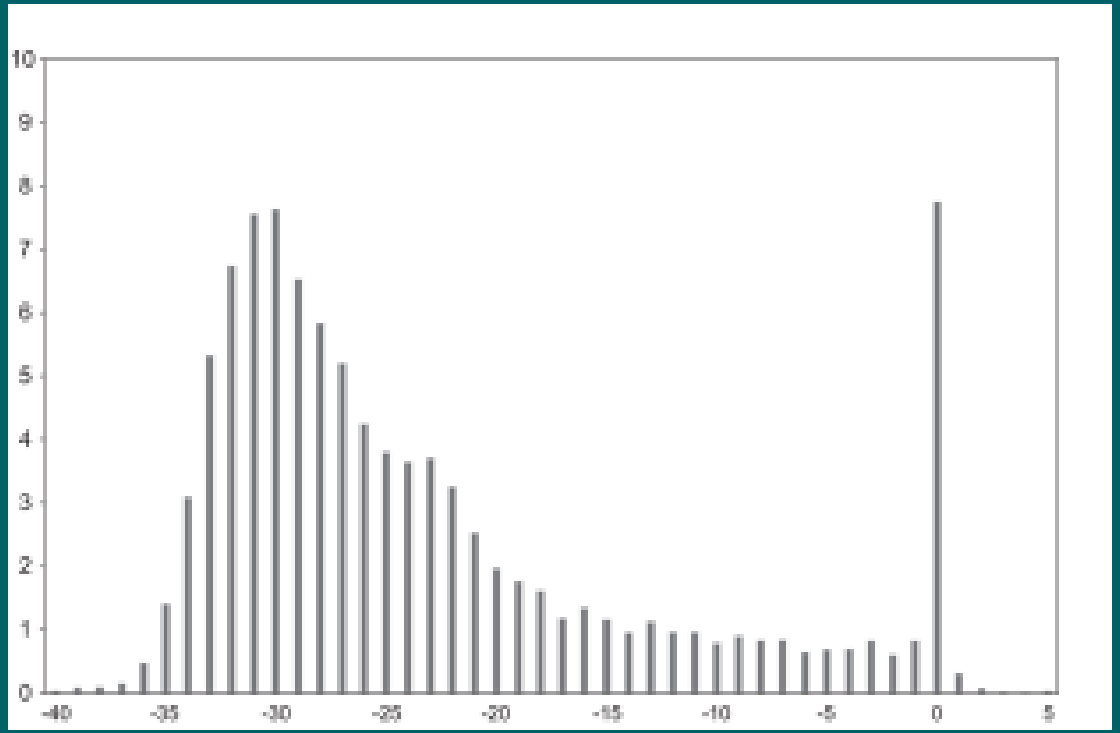
Characteristics of HBsAg-Positive Pregnant Women (N=15,205)

Characteristic	N(%)
Age (years)	
10-19	368 (2.4)
20-29	7,266 (47.8)
30-39	6,916 (45.5)
≥40	655 (4.3)
Race/ethnicity	
Asian/Pacific Islander	8,821 (58.0)
Black, non-Hispanic	3,576 (23.5)
White, non-Hispanic	1,218 (8.0)
Hispanic	658 (4.3)
Other, non-Hispanic	249 (1.6)

Characteristic	N(%)
Nativity	
U.S.-born	1,599 (10.5)
non-U.S.-born	11,293 (74.3)
Primary language	
Chinese	4,707 (31.0)
English	3,959 (26.0)
Spanish	415 (2.7)
Other Asian	857 (5.6)
Other	2,224 (14.7)

Walker et al. Characteristics of Pregnant Women With Hepatitis B Virus Infection in 5 US Public Health Jurisdictions, 2008-2012. Publ Hlth Rpts 2016

Timing of HBsAg Screening Relative to Infant Birth (N=14,981)



ACIP recommends screening during each pregnancy, at an early prenatal visit

- 13,316 (88.9%) screened during current pregnancy
- 1,160 (7.7%) screened during week of or at delivery
  - 304 (26.2%) not previously screened
  - 856 (73.8%) screened during previous pregnancy

Walker et al. Publ Hlth Rpts 2016

Testing for HBeAg and/or HBV DNA (N=14,098)

Characteristic	No. pregnancies	No. women tested (%)	P-value
Age (years)			0.001
10-19	315	65 (20.6)	
20-29	7,102	1,482 (20.9)	
30-39	6,094	1,144 (18.8)	
≥40	587	103 (17.5)	
Race/ethnicity			<0.001
Asian/Pacific Islander	8,532	1,830 (21.4)	
Black, non-Hispanic	3,381	719 (21.3)	
White, non-Hispanic	1,092	157 (14.4)	
Hispanic	410	28 (6.8)	
Other, non-Hispanic	165	11 (6.7)	

Walker et al. Publ Hlth Rpts 2016

Testing for HBeAg and/or HBV DNA, cont. (N=14,098)

Characteristic	No. pregnancies	No. women tested (%)	P-value
Place of birth			0.002
U.S.-born	1,131	198 (17.5)	
non-U.S.-born	11,424	2,450 (21.4)	
Race/ethnicity of non-U.S.-born			<0.001
Asian/Pacific Islander	7,822	1,672 (21.4)	
Black, non-Hispanic	2,399	620 (25.8)	
White, non-Hispanic	669	116 (17.3)	
Hispanic	310	23 (7.4)	
Other, non-Hispanic	116	9 (7.8)	

Walker et al. Publ Hlth Rpts 2016

Testing for HBeAg and/or HBV DNA, cont. (N=14,098)

Characteristic	No. pregnancies	No. women tested (%)	P-value
Race/ethnicity of U.S.-born			<0.001
Asian/Pacific Islander	273	98 (35.9)	
Black, non-Hispanic	559	67 (12.0)	
White, non-Hispanic	204	25 (12.3)	
Hispanic	36	3 (8.3)	
Other, non-Hispanic	13	1 (7.7)	

Walker et al. Publ Hlth Rpts 2016

Estimated HBsAg Prevalence among Pregnant Women

	% (95% CI)
Overall	0.38 (0.38-0.39)
Region of birth	
Africa	3.42 (3.27-3.56)
Australia/Oceania	0.19 (0.00-0.38)
Caribbean, excl Haiti	0.31 (0.28-0.34)
East Asia	8.73 (8.52-8.93)
Eastern Europe	0.59 (0.51-0.67)
Haiti	1.10 (1.00-1.20)
Mexico/Cent America	0.04 (0.03-0.04)

	% (95% CI)
Middle East	0.33 (0.27-0.38)
North America	0.05 (0.05-0.06)
Pacific Islands	1.58 (0.89-2.26)
South America	0.17 (0.14-0.19)
South Asia	0.42 (0.37-0.47)
Southeast Asia	3.92 (3.76-4.08)
Southern Europe	1.39 (1.20-1.57)
West/Central Asia	2.02 (1.72-2.32)
West/North Europe	0.16 (0.12-0.20)

Walker et al. Publ Hlth Rpts 2016

Infant Outcomes

Schillie et al., Outcomes of Infants Born to Women Infected With Hepatitis B. *Pediatrics* 2015; 135(5): e1141-7.

Factors Associated with Infection among Infants Born to HBsAg-Positive Mothers

Characteristic	HBsAg-positive infants, N (%)	HBsAg-negative infants, N (%)	p-value
Overall	100 (1.1)	9,152 (98.9)	
Maternal age (years)			0.01
<25	26 (1.8)	1,396 (98.2)	
25-29	32 (1.1)	2,870 (98.9)	
30-34	23 (0.9)	2,605 (99.1)	
≥35	17 (0.9)	1,858 (99.1)	
Maternal place of birth			0.20
U.S.-born	5 (0.6)	790 (99.4)	
non-U.S.-born	87 (1.1)	7,697 (98.9)	

Schillie et al. Pediatrics 2015

Factors Associated with Infection among Infants Born to HBsAg-positive Mothers, cont.

Characteristic	HBsAg-positive infants, N (%)	HBsAg-negative infants, N (%)	p-value
Maternal race			<0.01
Asian/Pacific Islander	81 (1.4)	5,752 (98.6)	
Black, non-Hispanic	11 (0.5)	2,081 (99.5)	
White, non-Hispanic	1 (0.1)	694 (99.9)	
Hispanic	2 (0.6)	323 (99.4)	
Other	1 (0.8)	123 (99.2)	
Number infant vaccine doses			0.01
≥3 doses	97 (1.1)	9,110 (99.0)	
<3 doses	3 (6.7)	42 (93.3)	

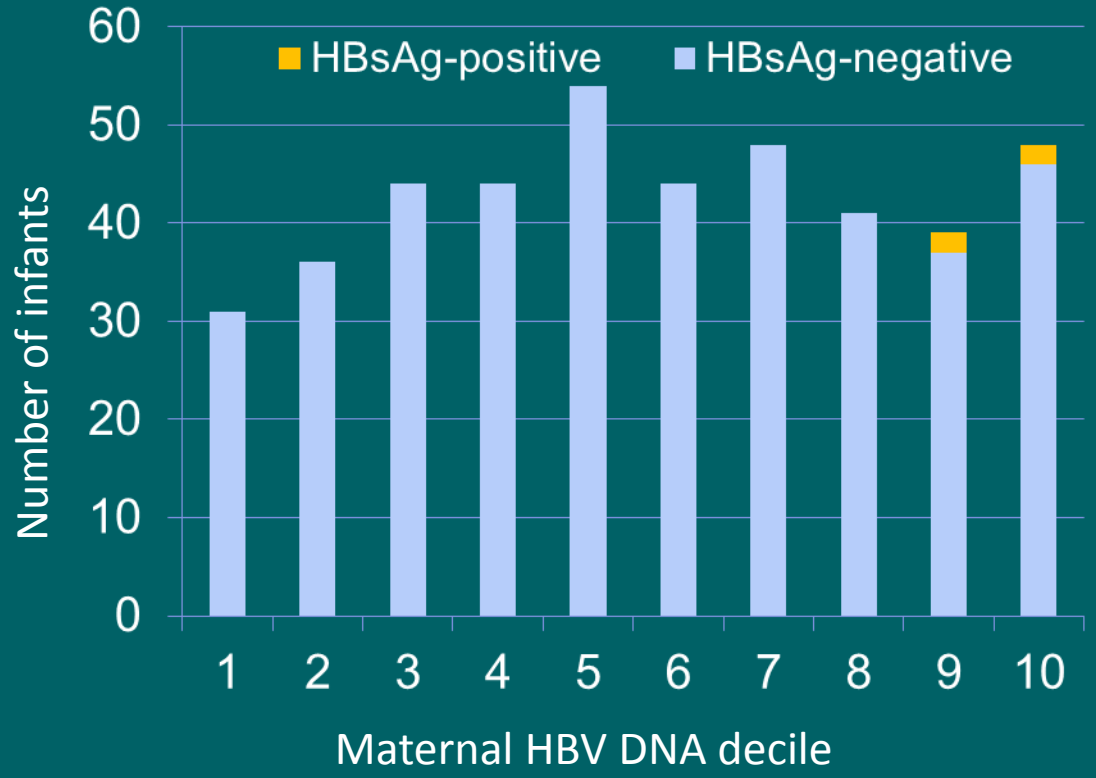
Schillie et al. Pediatrics 2015

Factors Associated with Infection among Infants Born to HBsAg-positive Mothers, cont.

Characteristic	HBsAg-positive infants, N (%)	HBsAg-negative infants, N (%)	p-value
Maternal viral load			
≥2000 IU/mL	4 (2.1)	184 (97.9)	0.04
<2000 IU/mL	0 (0.0)	241 (100.0)	
Maternal treatment			
Treated	6 (2.6)	229 (97.5)	0.05
Untreated	79 (1.1)	7,215 (98.9)	
Gestation length			
<37 weeks	13 (1.8)	730 (98.3)	0.09
≥37 weeks	85 (1.1)	7,908 (98.9)	

Schillie et al. Pediatrics 2015

Infant Infection Status by Maternal HBV DNA Decile[1] (N=429)



Schillie et al. Pediatrics 2015

- HBV DNA for mothers of 4 infected infants:
  - 8.1 log IU/mL
  - 100,000,000 copies/mL
  - 847,000,000 copies/mL
  - 108,963,583 IU/mL

[1]9th decile corresponds to HBV DNA >64,053 IU/mL (>5.3 log IU/mL or >550,000 copies/mL)

Factors Associated with Infection among Infants Born to HBsAg-Positive Mothers, cont.

- No significant association with
  - Infant birth weight: <2,000 g vs. ≥2,000 g (p=0.21)
  - Timing of vaccine birth dose: ≤12 hrs vs. >12 hrs (p=0.73)
  - Timing of HBIG: ≤12 hrs vs. >12 hrs (p=1.00)

Schillie et al. Pediatrics 2015

Factors Associated with Lack of HepB Vaccine Response among Infants Born to HBsAg-Positive Mothers

Characteristic	Adjusted odds for anti-HBs <10mIU/mL (95% CI)
Maternal age (years)	0.99 (0.96-1.01)
Maternal race (API vs. other)	1.25 (0.7, 2.24)
Gestation <37 weeks	1.52 (0.97, 2.38)
Vaccine birth dose >12 hours	1.53 (0.76, 3.06)
Final vaccine dose <164 days	1.74 (0.61, 5.01)
Fourth vaccine dose	0.5 (0.31, 0.81)
PVST >6 months from final dose	2.68 (2.02, 3.57)

Ko et al. Vaccine 2014

Conclusions

- 89% of HBsAg-positive pregnant women enrolled in the Program tested during current pregnancy
  - HBV DNA/HBeAg testing more common among non-U.S.-born women, Asian/Pacific Islanders, blacks
- 1.1% of infants infected
  - Infant infection associated with younger maternal age, Asian/Pacific Islander race, viral load ≥2000 IU/mL, and infant receipt of <3 vaccine doses
- Infant vaccine response reduced with 3 (vs. 4) vaccine doses and PVST >6 months after final vaccine dose

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.