Risk Factors Associated with Missed Hepatitis B Vaccine Birth Dose, Arizona, 2009

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BACKGROUND

Perinatal exposure to hepatitis B surface antigen (HBsAg) positive mothers is a continuing problem with acute and long term adverse effects for infants. In 2005, the Centers for Disease Control and Prevention (CDC) published updated recommendations of the Advisory Committee on Immunization Practices (ACIP) for prevention of hepatitis B virus (HBV) infections in children. These revised recommendations include administering hepatitis B vaccine (hepB) to all newborns before hospital discharge and administering appropriate immunoprophylaxis to infants born to HBsAg positive mothers or mothers of unknown HBsAg status.

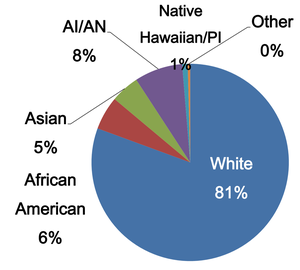
METHODS

The Arizona Department of Health Services (ADHS) randomly selected two cohorts from 2009 using the Arizona State Immunization Information System (ASIIS) and the Births Records Database. The two cohorts were infants who received the hepB birth dose within 3 days of birth and those who did not receive the birth dose within 14 days of birth. Medical records were reviewed for a total of 476 children born in Arizona. The following predictors were examined: race, insurance type, and complications of labor or delivery (defined as one or more of the following: low birth weight, low Apgar score, preterm delivery, abnormal conditions of the newborn, complications during labor, plurality, or newborn admitted to the intensive care unit (ICU)). Bivariate and multivariate analyses were conducted yielding unadjusted Mantel-Haenszel odds ratios and adjusted Wald odds ratios, respectively.

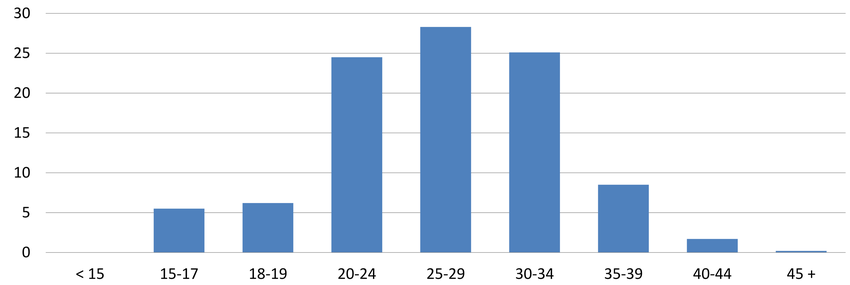
RESULTS

Population Characteristics

Maternal demographics of the entire study population are displayed in Graphs 1-4, respectively. These demographics include race, age distribution, education, and insurance type.



Graph 1. Percentage of mothers by race, Arizona, 2009.

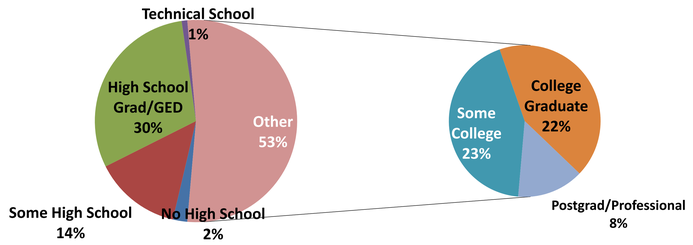


Graph 2. Percentage of mothers by age group, Arizona, 2009.

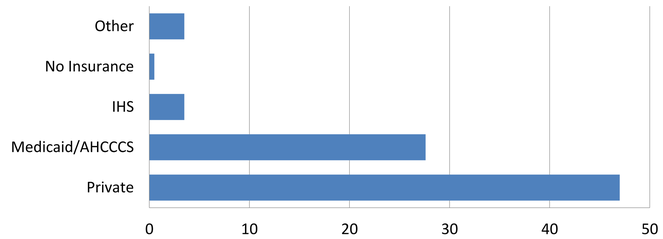
Table 1. Odds of not receiving the hepB birth dose

Risk Factor	Odds Ratio	95% CI	p-value[1]	
Race				
White	1.89	1.09 – 3.28	0.0221	*
African American	0.88	0.35 – 2.16	0.7761	
Asian	0.62	0.22 – 1.71	0.4825[2]	
AI/AN[3]	0.40	0.16 – 0.99	0.0422	*
Native Hawaiian/PI[4]	0.71	0.07 – 6.91	1.0000[2]	
Insurance				
Private	1.66	1.03 – 2.67	0.0372	*
Medicaid/AHCCCS	0.71	0.43 – 1.17	0.1739	
IHS	0.51	0.14 – 1.86	0.3948[2]	
No Insurance	.	.	0.5474[2]	
Education[5]				
No High School	1.42	0.40 – 5.13	0.7329[2]	
Some High School	0.51	0.26 – 1.00	0.0455	*
High School Grad/GED	0.78	0.50 – 1.23	0.2813	
Technical School	6.47	0.67 – 62.74	0.0994[2]	
Some College	0.94	0.58 – 1.52	0.7893	
College Graduate	1.65	1.03 – 2.63	0.0353	*
Postgrad/Professional	1.23	0.59 – 2.58	0.5844	
Risk Factors				
High Parity[6, 7]	0.37	0.04 – 3.08	0.4436	
Plurality	2.78	1.12 – 6.86	0.0217	*
Improper Birth Spacing[8]	0.92	0.49 – 1.75	0.8086	
Tobacco Use[9]	2.16	1.00 – 4.67	0.0456	*
Alcohol Use[9]	1.81	0.60 – 5.50	0.2884	
Drug Use	1.02	0.37 – 2.78	0.9691	
Late Prenatal Care[10]	1.15	0.76 – 1.74	0.5190	
Insufficient Prenatal Care[11]	0.98	0.61 – 1.57	0.9335	
Complications				
Labor Complications	1.65	1.06 – 2.56	0.0252	*
Preterm Delivery[12]	3.82	2.32 – 6.30	< 0.0001	*
Long Hospital Stay[13]	3.03	1.86 – 4.96	< 0.0001	*
Newborn Abnormal	5.12	3.11 – 8.43	< 0.0001	*
ICU[14]	9.92	5.62 – 17.52	< 0.0001	*
LBWT[15]	5.40	2.90 – 10.06	< 0.0001	*
Low Apgar[16]	5.51	1.06 – 28.77	0.0359	*

[1] Pearson's Chi Square test, unless otherwise noted; [2] Fisher's Exact test; [3] AI/AN = American Indian/Alaska Native; [4] PI = Pacific Islander, [5] Highest Level of Education completed; [6] Not including this child; [7] Five or more pregnancies; [8] Two or less years between births; [9] During the 12 months before delivery; [10] Entered prenatal care at two months gestation or later; [11] Less than 10 prenatal care visits, [12] Gestation less than 37 weeks; [13] Longer than ten days; [14] Newborn admitted to the Intensive Care Unit (ICU); [15] Less than 5 pounds 8 ounces; [16] American Academy of Pediatrics definition: Five-minute Apgar score less than 7, *Statistically significant at α = 0.05



Graph 3. Percentage of mothers by education level, Arizona, 2009



Graph 4. Percentage of mothers by insurance type, Arizona, 2009

Cohort Comparison

Of children born in Arizona in 2009, 68.3% (315/461) received the first dose of hepB within 3 days of birth and 31.7% (146/461) did not.

- Children of mothers with private insurance were approximately twice as likely (adjusted odds ratio [OR = 1.8, 95% confidence interval [CI] = 1.08 – 3.04) to miss the hepB birth dose than those of mothers with insurance of another type (e.g., Medicaid), after adjusting for the mother's race.
- Children of mothers who experienced complications during labor or delivery were more than twice as likely (adjusted odds ratio [OR = 2.3, 95% confidence interval [CI] = 1.38 – 3.83) to miss the hepB birth dose than those of mothers who did not experience complications, after adjusting for the mother's race.
- Mother's education level was not a significant predictor in the model and confounded the effects of insurance type, so the final model did not adjust for mother's education; however, model fit statistics suggest that this did not bias the parameter estimates.

Table 2. Odds of not receiving the hepB birth dose using Wald Odds Ratios and Confidence Intervals for Multivariate Logistic Regression Model

Parameter	OR	95% Wald Confidence Limits	Wald Chi-Square Value	p-value
Race[1]	1.6	0.816 – 3.307	1.9304	0.1647
Insurance[2]	1.8	1.075 – 3.035	4.9905	0.0255
Complications of Labor or Delivery[3]	2.3	1.384 – 3.831	10.3005	0.0013

[1] Race = White or Non-white, [2] Insurance = Private or Not Private, [3] No Complications or one or more of the following: Low Birth Weight, Low Apgar Score, Preterm Delivery, Abnormal Conditions of the Newborn, Complications During Labor, Plurality, Newborn Admitted to ICU

CONCLUSIONS

Children born to mothers with private insurance may be less likely to receive the birth dose because of concerns over vaccine safety or because these mothers have more freedom in selecting the kinds of care their children do and do not receive. Children born to mothers who had complications during labor or delivery may be more likely to require intensive care in the days following birth; as a result, physicians may not administer the vaccine within 3 days of birth. Educational messages promoting hepatitis B vaccination of newborns should be targeted towards pregnant women and women of child-bearing age with private insurance and healthcare providers who attend to mothers and infants experiencing labor or delivery complications. Future research of a larger sample should examine which risk factors predict whether a mother declines the hepB birth dose for her child. In addition, more research is needed to determine the effects of insurance type on quality of maternal and child health care and to determine why children born to mothers with complications during labor or delivery are less likely to receive the birth dose.