

# **Surveillance for Perinatal Hepatitis B Virus Infection**

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# Perinatal Transmission of Hepatitis B Virus

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- ▶ Estimated 24,000 infants born to hepatitis B surface antigen (HBsAg) positive women
- ▶ Without intervention, approx. 40% of infants become infected with HBV
- ▶ 85-90% of infections can be prevented by post-exposure prophylaxis:
  - hepatitis B immune globulin (HBIG) and 3-4 doses of hepatitis B vaccine

# Perinatal HBV Surveillance *Objectives*

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- Monitor trends in the number of perinatal HBV infections
- Identify infected children for follow-up/referral
- Identify and monitor reasons for cases occurring among infants

# Why did these infections occur?

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- **Missed opportunity?**
  - Delayed HBIG and/or HBV vaccine doses
  - Incomplete vaccination
- **Failure of prophylaxis?**

# Elements of surveillance

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1. Case definition
2. Case ascertainment and identification
3. Case investigation
4. Case reporting
5. Analysis...and action

# **1. Surveillance Case Definition**

## **Perinatal HBV Infection**

- ***Nationally notifiable since 1995***
- ***Case classification***
  - HBsAg positivity in any infant <24 months old, who was born in the U.S. or in U.S. territories to HBsAg-positive mother.
- ***Clinical description***
  - Ranges from asymptomatic to fulminant hepatitis.

## 2. Case Ascertainment

### Finding Perinatal HBV Infections

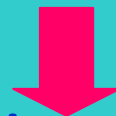
Identification of HBsAg + mother



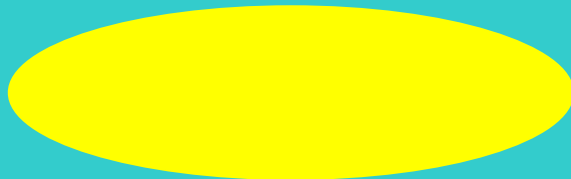
Identification of at- risk infant



HBIG and 3-4 doses of vaccine for at-risk Infants



Post-vaccination Testing



Susceptible  
Infants

# **3. Case Investigation**

## **What information do we need about cases of perinatal HBV infection?**

- **Confirming the case:**
  - HBsAg test results for the child and mother
  - Date of diagnosis
  - Age of child
  - Child's country of birth
- **Post-exposure prophylaxis history:**
  - Date and dosage of HBIG
  - Date and dosage of all hepatitis B vaccine doses
- **Other characteristics of child:**
  - sex, race
  - additional laboratory results
- **Other characteristics of mother:**
  - age, race and country of birth
  - Additional laboratory results (e.g. HBV DNA, HBeAg)

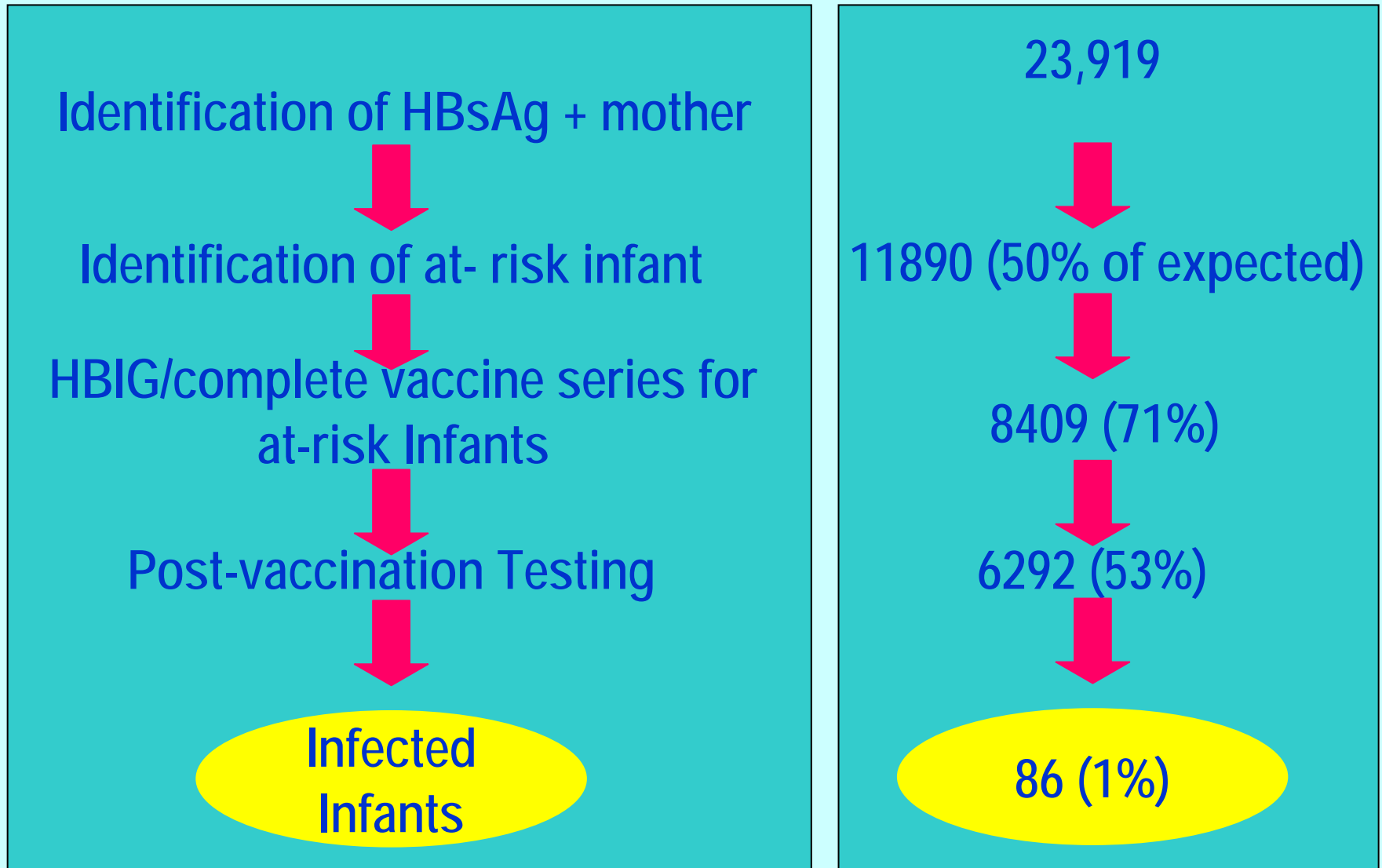
# 4. Case Reporting

## Who needs to know about cases of perinatal HBV infection?

- Annual reporting as part of CDC perinatal HBV prevention program assessment
  - Direct reporting by state coordinators to CDC perinatal HBV prevention program
  - Aggregate counts by state /no additional info
- Weekly reporting to NNDSS (via NETSS)
  - Reporting done via state communicable disease departments
  - Started in 2001
  - Uses event code 10104
  - Line listed data allows reporting of case specific data
    - With NETSS, only limited data elements (e.g. age, race, sex)
    - With NEDSS, reporting of more information(e.g. vaccination history, other laboratory tests) possible.

# Status of surveillance for perinatal HBV infection:

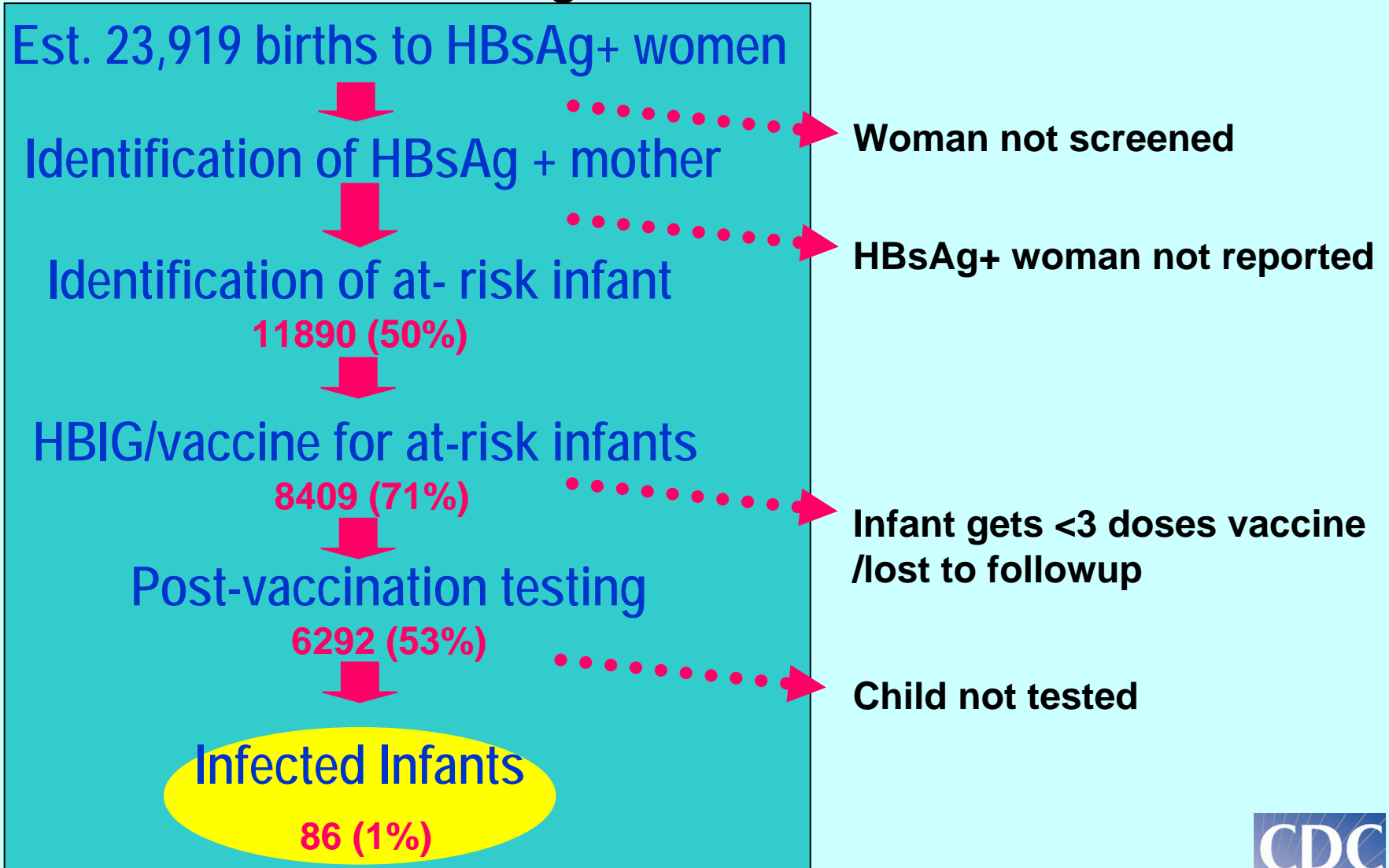
How're we doing in 2005?



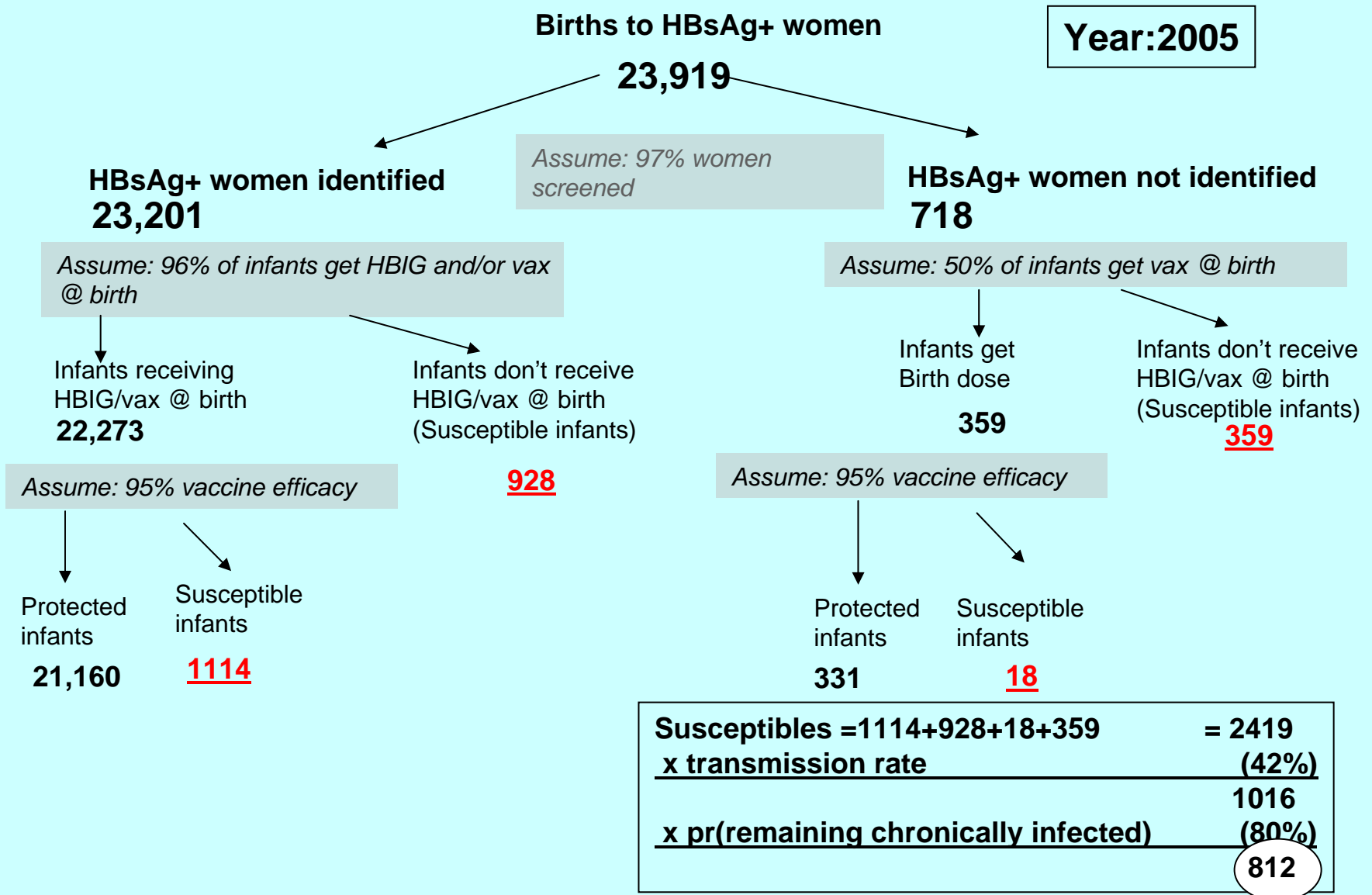
Source: Draft 2005 Annual Assessment of Progress towards goals to prevent perinatal HBV transmission

# Status of surveillance for perinatal HBV infection:

## Missing cases in 2005?



# Perinatal HBV infections: How many are there?



<b>Susceptibles =</b>	<b>1114+928+18+359</b>	<b>= 2419</b>
<b>x transmission rate</b>		<b>(42%)</b>
		<b>1016</b>
<b>x pr(remaining chronically infected)</b>		<b>(80%)</b>
		<b>812</b>

# An estimate is just an estimate

- Dependent on the assumptions .....
- Many assumptions go into this estimate and these could be expanded or changed....
- Current assumptions are conservative....

## Three Important Ones

- Number of births to HBsAg+ women
- All infants of tested HBsAg+ women are equally likely to complete PEP regardless of whether they receive case mgmt
- Women who aren't screened have similar prevalence of HBsAg as screened women.

# Post-Exposure Immunization by Receipt of Case Management

State (yrs)	Case management	No. (%)	HBIG and HepB at birth No. (%)	Complete series by 8 mo No. (%)
Alabama (1990-2002)	Yes	982 (78)	905 (92)	828 (90)
	No	318 (22)	212 (67)	189 (59)
Connecticut (1994-1995)	Yes	64 (52)	64 (100)	52 (90)
	No	58 (48)	52 (90)	189 (48)

Sources: Brian Wheeler, Alabama Department of Public Health, 2004  
MMWR 1996;45:584-7



# HBsAg Prevalence among Pregnant Women by Prenatal Screening Status, Philadelphia, 1991

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Prenatal Screening	No. of Women Tested	HBsAg-positive No. (%)
Yes	1555	12 (0.8)
No	208	14 (6.7)

Source: JAMA 1991;266:2852-5



# Conclusions

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- No reliable data to measure incidence of perinatal HBV infection
  - Cases represent  $\ll 10\%$  of estimated infections
  - Missed cases occur at all stages
    - from identification of HBsAg+ mother to postvaccination testing of infant
- Estimated incidence used to measure program impact
  - Dependent upon accuracy of assumptions
  - Conservative estimate

# **Status of surveillance for perinatal HBV infection:**

## **What do we know about the cases we do identify?**

- Use NNDSS case data
  - Line listed data (vs. aggregate counts n annual assessment)
  - Limited data (age,race,sex) available but since 2001, have followed up with reporting states to get additional information(e.g. vaccine history)
- All cases reported in annual assessment should be in NNDSS and vice versa

## Cases of perinatal HBV infection reported through NNDSS, 2002-2006

	TOTAL*	
<b># cases reported</b>	<b>759 (131-215/yr)</b>	
	<b>x</b>	<b>%</b>
<b># that were "true" cases</b>	<b>191</b>	<b>25</b>
<b># that were not confirmed cases</b>	<b>568</b>	<b>75</b>
<b>&gt;data entry errors</b>	<b>346</b>	<b>46</b>
<b>&gt;hepatitis B but not U.S. perinatal</b>	<b>140</b>	<b>18</b>
<b>&gt;insufficient info to assess/lost to followup</b>	<b>82</b>	<b>11</b>

Excluding 37 pending cases in 2006



# Reported cases: Annual assessment vs. NNDSS

	Annual Assessment		NNDSS (verified cases)	
	# reports	#states+cities	# reports	# states
2001	102	24+ 2	18	4
2002	97	21+ 3	41	13
2003	77	23+ 2	54	10
2004	84	24+ 2	37	13
2005	87	25+ 3	28	10
TOTAL	447 (89/yr)		178	

# Characteristics of cases of perinatal HBV infection reported through NNDSS, 2002-2006

		TOTAL	
<b>Number of <u>true</u> cases</b>		<b><u>191</u></b>	
		X	%
<b>Male gender</b>		<b>108</b>	<b>57</b>
<b>Age at diagnosis</b>		<b>13.2 months</b>	
<b>Race</b>	<b>Asian Pacific Islander</b>	<b>110</b>	<b>58</b>
	<b>Black</b>	<b>14</b>	<b>7</b>
	<b>White</b>	<b>13</b>	<b>7</b>
	<b>Other/unknown</b>	<b>54</b>	<b>28</b>



# Immunization history of cases of perinatal HBV infection reported through NNDSS, 2002-2006

	TOTAL	
Number of <u>true</u> cases	<u>191</u>	
	X	%
No history of vaccination	19	10
Got HBIG within 1 day of birth	141	74
Got first vaccine dose (with or without HBIG) within 1 day of birth	159	83
<u>and</u> got dose 2 within 30-60 days of birth	100	52
<u>and</u> got dose 3 within 180-210 days of birth	56	29

# Conclusions

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Characteristics of cases that have been reported indicate:

- Most are Asian/Pacific Islander
- More are male
- Majority of cases have no history of vaccination or vaccination was delayed/incomplete
  - Suggests missed prevention opportunities, not failure of prophylaxis

Not all cases that are reported through annual assessment are reporting line listed case data through NNDSS

- At least 16 states not reporting through NETSS

# Recommendations to improve surveillance for perinatal HBV

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- Screening of all pregnant women for HBsAg
  - Local regulations to require prenatal HBsAg screening
  - Work with obstetrical community to increase screening
- Reporting of all HBsAg+ women to health department and identification of their infants to perinatal HBV prevention program
  - Make HBsAg+ results in pregnant women a reportable condition
  - Work with labs, clinicians and others in birthing hospitals to improve reporting of HBsAg+ women
  - Document maternal HBsAg status on birth certificate and/or newborn screening card
- Maximize the number of infants who complete vaccination and receive post-vaccination testing
  - Case management protocols to ensure follow-up
  - Work with pediatric community to emphasize need for appropriate immunoprophylaxis and post-vaccination testing

# Recommendations to improve surveillance for perinatal HBV infection

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- Ensure that all cases are completely investigated and reported
  - Establishment of database of HBsAg and antiHBs test results for infants born to HBsAg+ women
  - Standardized collection of complete information on infected infants
  - Strengthen communication between perinatal HBV coordinator and others in health department (e.g in communicable disease) who receive (or should receive) reports of HBV infection.
  - Verify that cases reported through the perinatal HBV prevention program has also been reported to CDC via NNDSS (and vice versa)

***Thanks!***

**Questions?**

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