Texas Perinatal Hepatitis B Summit 2022

Immunization Section
Perinatal Hepatitis B Prevention Program

Welcome

- All Summit presentation slides will be emailed to attendees post event.
- This Summit is being recorded. This recording will be made available to all attendees via a link sent to your email address post event.
- All attendees will be muted throughout the Summit.
- We encourage attendees to use the question box throughout each presentation to ask questions of our presenters. DSHS staff will ask questions out loud for speakers to address at the end of each session.

Agenda

- **9:00 - Opening Remarks**
  - Jennifer A. Shuford, MD, MPH; Chief State Epidemiologist, DSHS
- **9:15 - Perinatal Hepatitis B: A National Perspective**
  - Nancy Fenlon, RN, MS; CDC: Perinatal Hepatitis B Prevention Program
  - LCDR Mark K. Weng, MD, MSc; CDC: Prevention Branch, Division of Viral Hepatitis
- **10:45 - 15 minute break**
- **11:00 - Hepatitis B Perinatal Prevention**
  - Catherine Freeland, PhD (c), MPH; Public Health Program Director, Hepatitis B Foundation
- **12:00 – Lunch Break**
- **1:00 –Texas Children's Hospital Perinatal Hep B**
  - F. Blaine Hollinger, MD, FAASLD, AGAF, FIDSA; Baylor College of Medicine
  - Neelima Agrawal, MD, MPH; Texas Children's Hospital & Baylor College of Medicine
- **2:30 – 15 minute break**
- **2:45 – Texas Perinatal Hep B Prevention Program Reports**
  - Sarah Auerbach, MPH; Epidemiologist, DSHS
  - Kathy Lowry, MSN, RN
- **3:50 – Closing Remarks**
  - Imelda Garcia, MPH; Associate Commissioner for Laboratory and Infectious Disease Services, DSHS

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Successful completion of this continuing education event requires that you:

- Complete registration
- Attend the entire event
- Participate in education activities
- Complete the participant evaluation

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- The following Planning Committee members and speakers for this event have disclosed financial interest(s):
  - Catherine Freeland, PhD, MPH
    - Member of Patient Advisory Board at Gilead Sciences
- All relevant financial relationships have been mitigated

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- Complete and submit the evaluation by **Monday, May 23rd**

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Opening Remarks

Jennifer Shuford, MD, MPH
Chief State Epidemiologist, DSHS

Perinatal Hepatitis B: A National Perspective

Nancy Fenlon, RN, MS; CDC: Perinatal Hepatitis B Prevention Program

LCDR Mark K. Weng, MD, MSc; CDC: Prevention Branch, Division of Viral Hepatitis

The Perinatal Hepatitis B Program: A National Perspective

Nancy Fenlon RN, MS

Perinatal Hepatitis B Prevention Program

LCDR Mark K. Weng, MD, MSc

Prevention Branch, Division of Viral Hepatitis

2022 Texas Perinatal Hepatitis B Prevention Meeting

May 20, 2022

Presentation Outline

- Background: hepatitis B virus infection
- ACIP perinatal hepatitis B recommendations
- ACIP recommendations into real life
- Interim COVID-19 guidance
- National Perinatal Program
  - Overview
  - Key outcomes
  - Special populations
  - Best practices/Resources
- ACIP Adult Recommendations

Learning Objectives

- Describe the ACIP Recommendations to Prevent Perinatal Hepatitis Virus Transmission
- Describe the purpose and structure of the Perinatal Hepatitis B Prevention Program (PHBPP)
- Describe how to respond to 1-2 common issues that can occur during case management of a hepatitis B virus exposed infant
- Describe the new ACIP Adult hepatitis B recommendations

Background: Hepatitis B virus

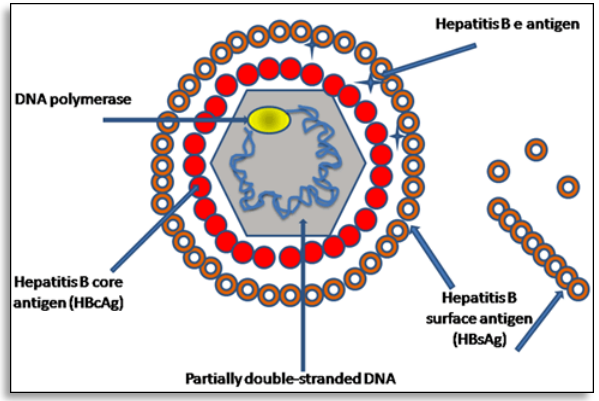
- Viral infection that attacks the liver
- Can be an acute or chronic infection
- WHO estimated 257 million individuals chronically infected with hepatitis B world-wide
  - 850,000 individuals living in the United States
    - The majority (2/3rds) of these individuals are unaware of their infection
- HBV is highly infectious. Can be transmitted in the absence of visible blood and remain viable on environmental surfaces for at least 7 days

http://www.cdc.gov/hepatitis/resources/professionals/pdfs/abctable.pdf

https://www.who.int/news-room/fact-sheets/detail/hepatitis-b

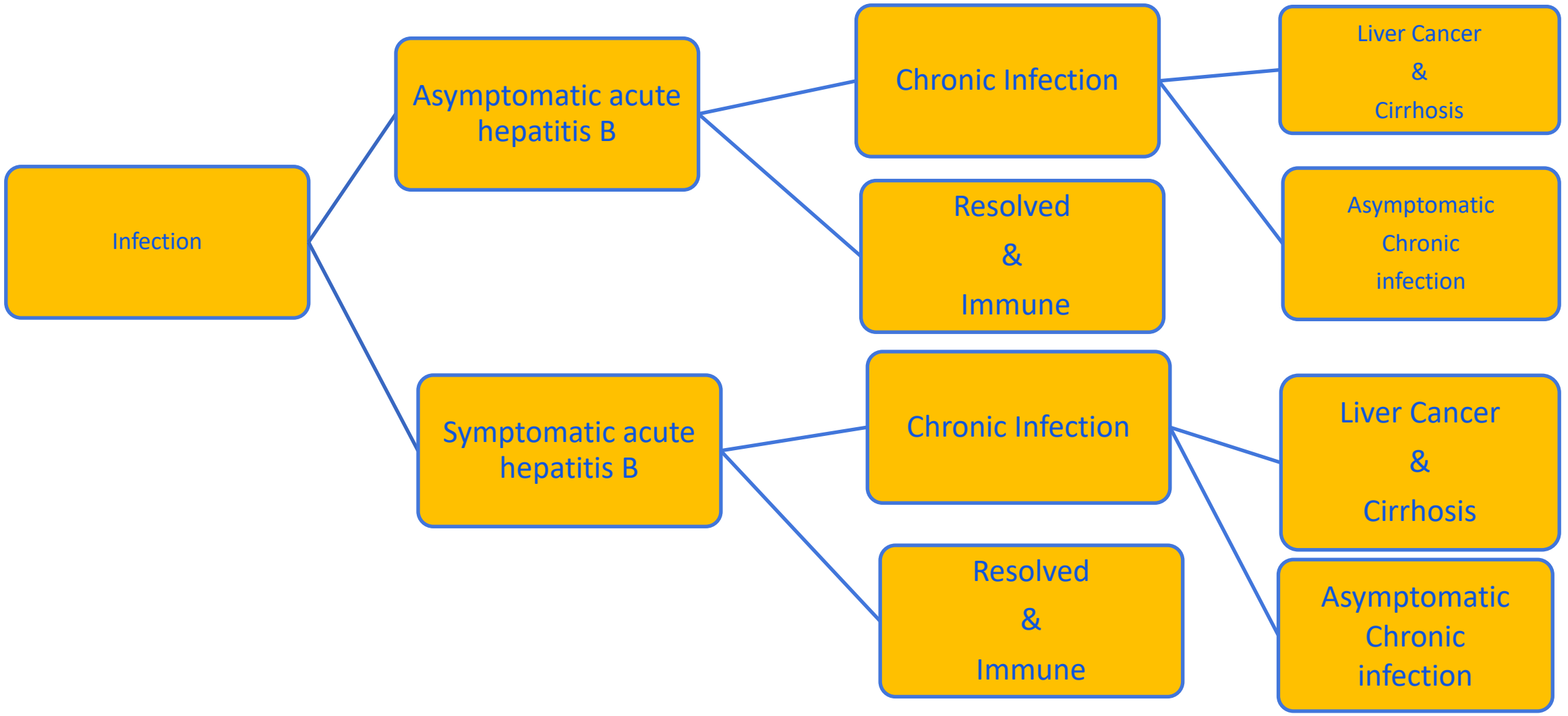
Hepatitis B in the United States

- 20,700 estimated acute hepatitis B virus (HBV) infections each year (95% CI: 11,800–50,800)[1]
- > $1 billion spent on hepatitis B-related hospitalizations each year (not including indirect costs)[2]

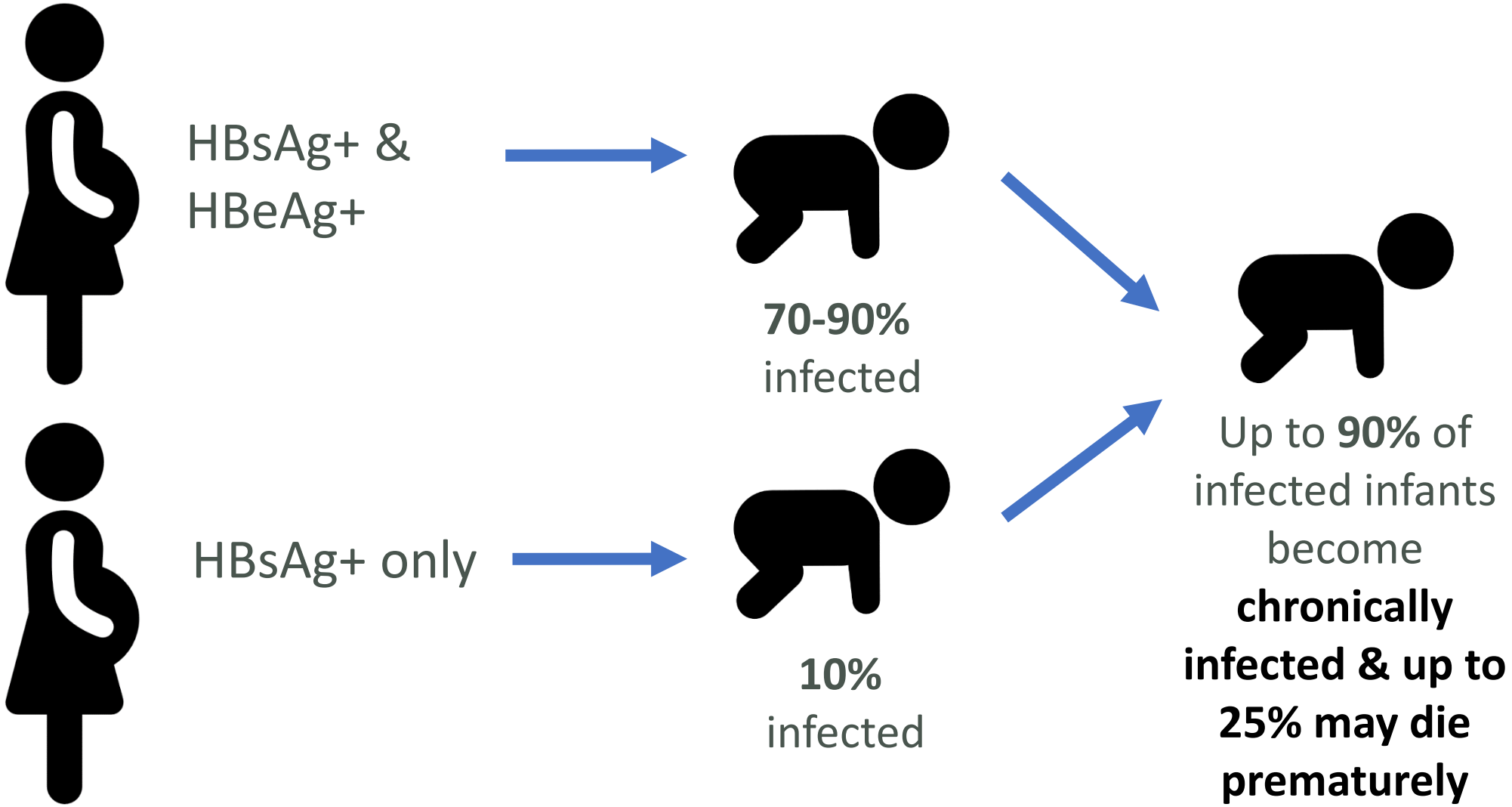


[1] https://www.cdc.gov/hepatitis/statistics/2019surveillance/HepB.htm
[2] Corte, et al. J Gastroenterol Hepatol. 2014.

Natural History of Hepatitis B virus infection



Hepatitis B Perinatal Transmission*

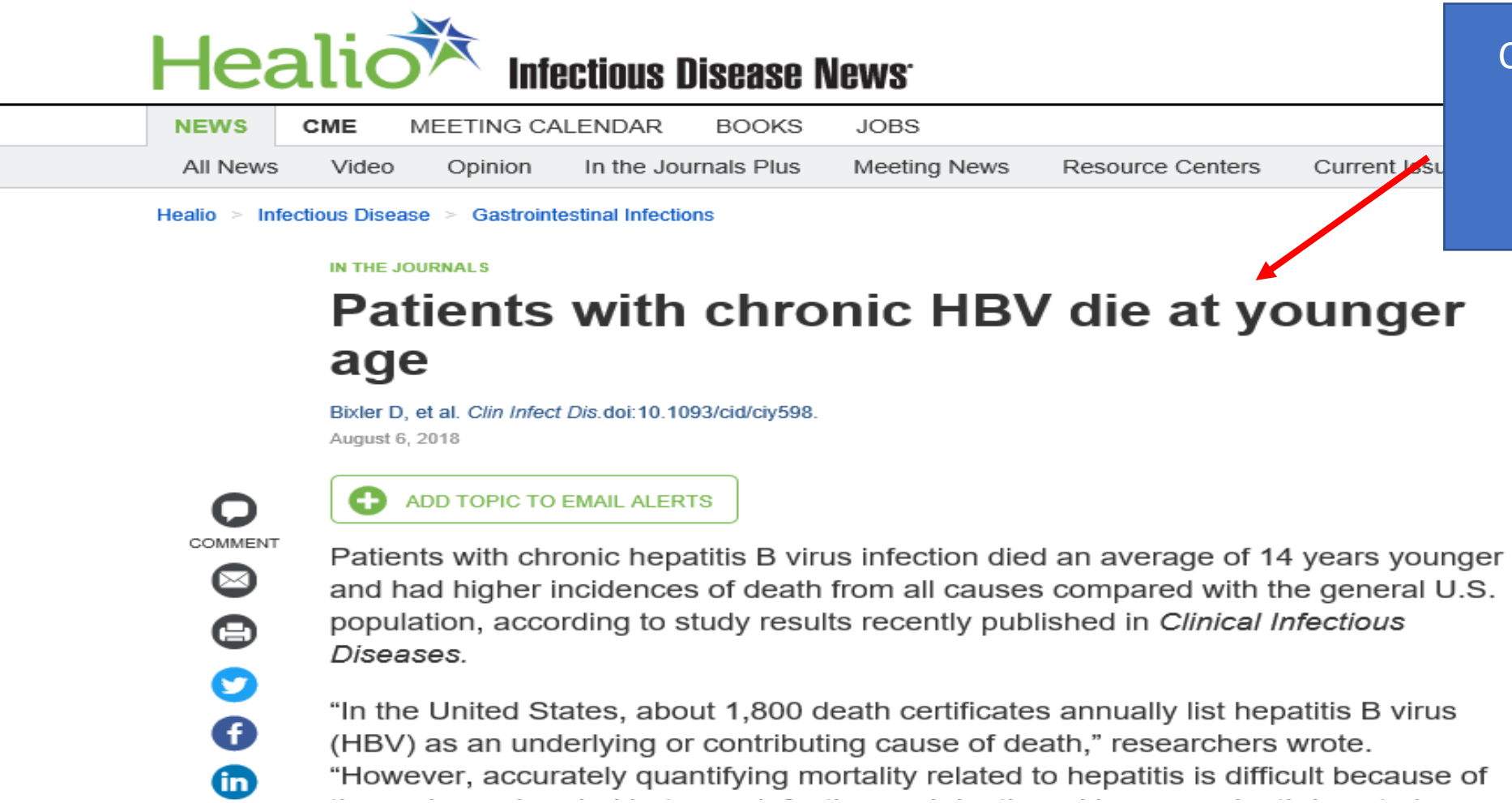


*In the absence of postexposure prophylaxis

Slide credit with modifications CEB/ISD/NCIRD/CDC 2021

The Bottom Line

Chronic HBV- infected patients died an average of 14 years younger than the general US population



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IN THE JOURNALS

Patients with chronic HBV die at younger age

Bixler D, et al. *Clin Infect Dis*. doi:10.1093/cid/ciy598.

August 6, 2018

ADD TOPIC TO EMAIL ALERTS

COMMENT

Patients with chronic hepatitis B virus infection died an average of 14 years younger and had higher incidences of death from all causes compared with the general U.S. population, according to study results recently published in *Clinical Infectious Diseases*.

"In the United States, about 1,800 death certificates annually list hepatitis B virus (HBV) as an underlying or contributing cause of death," researchers wrote. "However, accurately quantifying mortality related to hepatitis is difficult because of

Prevention of Perinatal Hepatitis B Virus Transmission: New(er) ACIP Recommendations (2018)

Prevention of Perinatal Hepatitis B Virus Transmission – (Newer) ACIP Recommendations

- All HBsAg-positive pregnant women should be tested for HBV DNA to guide the use of maternal antiviral therapy during pregnancy for the prevention of perinatal HBV transmission (new recommendation).
- American Association for the Study of Liver Disease (AASLD) suggests maternal antiviral therapy when the maternal HBV DNA is >200,000 IU/mL (new recommendation).

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

Prevention of Perinatal Hepatitis B Virus Transmission – (Newer) ACIP Recommendations

- Infants born to women for whom HBsAg testing results during pregnancy are not available but other evidence suggestive of maternal HBV infection exists (e.g., presence of HBV DNA, HBeAg-positive, or mother known to be chronically infected with HBV) should be managed as if born to an HBsAg-positive mother (new recommendation).
- For infants transferred to a different facility after birth (e.g., hospital with higher level of neonatal care), staff at the transferring and receiving facilities should communicate regarding the infant's HepB vaccination and HBIG receipt status to ensure prophylaxis is administered in a timely manner (new recommendation).

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

Prevention of Perinatal Hepatitis B Virus Transmission –(Newer) ACIP Recommendations

- If it is not possible to determine the mother's HBsAg status (e.g., when a parent or person with lawful custody safely surrenders an infant confidentially shortly after birth), the vaccine series should be completed according to a recommended schedule for infants born to HBsAg-positive mothers (new recommendation).
- The final dose in the series should not be administered before age 24 weeks (164 days). These infants should receive postvaccination serologic testing at age 9–12 months, and revaccination if necessary (new recommendation).

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

Prevention of Perinatal Hepatitis B Virus Transmission –(Newer) ACIP Recommendations

- HBsAg-negative infants with anti-HBs <10 mIU/mL should be revaccinated with a single dose of HepB vaccine and receive postvaccination serologic testing 1–2 months later (new recommendation).

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

Prevention of Perinatal Hepatitis B Virus Transmission: ACIP Recommendations (2018)

Identification of HBV-Infected Pregnant Persons

- Test all pregnant women early in each pregnancy for HBsAg
- All HBsAg-positive women should be tested for HBV DNA (New Recommendation)
  - American Association for Study for Liver Disease (AASLD) suggest antiviral therapy when DNA >200,000 IU/mL in 3rd trimester (New Recommendation)
- Refer all HBsAg-positive women to the jurisdiction's PHBPP
- Test at time of admission to Labor & Delivery if
  - Not previously tested in current pregnancy
  - Clinical hepatitis (symptomatic)
  - Retest women who are high risk for HBV infection
    - Recent or current injection-drug use, having had more than one sex partner in the previous 6 months or an HBsAg-positive sex partner, having been evaluated or treated for a STI

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

Babies Born to HBsAg-positive and HBsAg-Unknown status persons Babies Weighing >/=2000 grams: Postexposure Prophylaxis

HBsAg-**POSITIVE** mother

Administer HepB vaccine and HBIG* within 12 hours of birth.

*Administer HepB vaccine and HBIG in separate limbs .

Slide credit: CEB/ISD/NCIRD/CDC 2021 with modifications

HBsAg **UNKNOWN** mother

Administer HepB vaccine within 12 hours of birth and test to determine mother's status ASAP. If HBsAg-positive, administer HBIG* within 7 days of birth. If status remains unknown manage as if positive.

Babies Born to HBsAg-positive and HBsAg-Unknown status persons: Weighing <2000 grams Postexposure Prophylaxis

HBsAg-**POSITIVE** mother

Administer HepB vaccine and HBIG* within 12 hours of birth.

HBsAg **UNKNOWN** mother

Administer HepB vaccine and HBIG* within 12 hours of birth. Determine HBsAg status, if status remains unknown manage as if positive.

*Administer HepB vaccine and HBIG in separate limbs .
Slide credit CEB/ISD/NCIRD/CDC 2021 with modifications

Completing the hepatitis B vaccine series

- Series completion depends on 2 factors
- Birth weight
  - Infants with birth weight <2,000 grams birth dose is NOT COUNTED as part of the 3-dose series because of the potentially reduced immunogenicity of HepB vaccine in these infants . These infants need a total of 4 doses.
  - Single antigen- Dose #2 at 1 month of age for infants <2,000 grams.
  - Combination vaccine- Dose #2 at 2 months of age for all birth weight infants.
- Vaccine formulation used to complete the hepatitis B series
  - Single antigen vs. combination vaccine
  - Complete with combination vaccine= 4 doses total for all infants.
- Final dose no earlier than 24 weeks or 164 days of age (this includes the 4- day grace period)

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31

TABLE 3. Hepatitis B vaccine schedules for infants, by infant birthweight and maternal HBsAg status

		Single-antigen vaccine		Single-antigen + combination vaccine†	
Birthweight	**Maternal HBsAg status**	**Dose**	**Age**	**Dose**	**Age**
≥2,000 g	Positive	1	Birth (≤12 hrs)	1	Birth (≤12 hrs)
		HBIG§	Birth (≤12 hrs)	HBIG	Birth (≤12 hrs)
		2	1–2 mos	2	2 mos
		3	6 mos¶	3	4 mos
				4	6 mos¶
	Unknown*	1	Birth (≤12 hrs)	1	Birth (≤12 hrs)
		2	1–2 mos	2	2 mos
		3	6 mos¶	3	4 mos
				4	6 mos¶
	Negative	1	Birth (≤24 hrs)	1	Birth (≤24 hrs)
		2	1–2 mos	2	2 mos
		3	6–18 mos¶	3	4 mos
				4	6 mos¶
<2,000 g	Positive	1	Birth (≤12 hrs)	1	Birth (≤12 hrs)
		HBIG	Birth (≤12 hrs)	HBIG	Birth (≤12 hrs)
		2	1 mos	2	2 mos
		3	2–3 mos	3	4 mos
		4	6 mos¶	4	6 mos¶
	Unknown	1	Birth (≤12 hrs)	1	Birth (≤12 hrs)
		HBIG	Birth (≤12 hrs)	HBIG	Birth (≤12 hrs)
		2	1 mos	2	2 mos
		3	2–3 mos	3	4 mos
		4	6 mos¶	4	6 mos¶
	Negative	1	Hospital discharge or age 1 mo	1	Hospital discharge or age 1 mo
		2	2 mos	2	2 mos
		3	6–18 mos¶	3	4 mos
				4	6 mos¶

Abbreviations: HBIG = hepatitis B immune globulin; HBsAg = hepatitis B surface antigen.

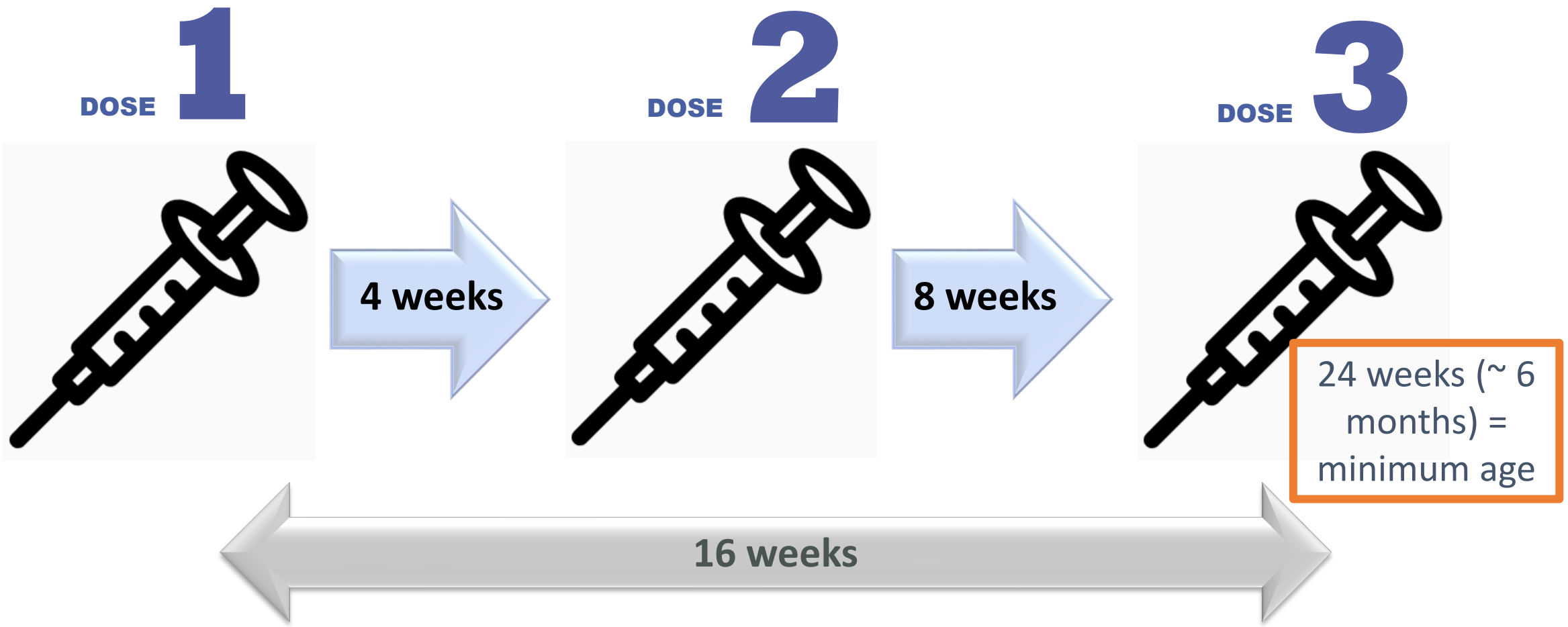
* Mothers should have blood drawn and tested for HBsAg as soon as possible after admission for delivery; if the mother is found to be HBsAg positive, the infant should receive HBIG as soon as possible but no later than age 7 days.

† Pediarix should not be administered before age 6 weeks.

§ HBIG should be administered at a separate anatomical site from vaccine.

¶ The final dose in the vaccine series should not be administered before age 24 weeks (164 days).

HepB Schedule: Minimum Age and Intervals



4-day grace can be applied to minimum age and intervals

Slide credit- Community Education Branch/Immunization Services Division/ NCIRD/ISD

Post Vaccination Serologic Testing: The basics

- If series completed on time, PVST at age 9-12 months
  - HBIG passive antibodies cleared
  - Identify late occurring infection
  - Never before 9 months of age
  - No grace period
- If series completion is delayed, 1-2 months after final dose
  - ≥ 1 month post final dose to avoid possible transient positivity from last Hep B vaccine dose.
- HBsAg and anti-HBs only
- Never anti-HBc
  - Maternal anti-HBc maybe measure until 24 months of age
- Antibodies wane quickly after series is complete. So, delay in PVST may mean unnecessary revaccination and repeat PVST.
- Results
  - HBsAg-neg and anti-HBs >/=10mIU/mL no further management needed.
  - HBsAg –neg and anti-HBs<10 mIU/mL revaccination required.

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

A word on revaccination

- Infants with PVST results of HBsAg-negative and anti-HBs<10 mIU/mL
- Option A which is the “new recommendation”
  - HBsAg-negative infants with anti-HBs <10 mIU/mL should be revaccinated with a single dose of HepB vaccine and receive postvaccination serologic testing 1–2 months later (new recommendation).

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31

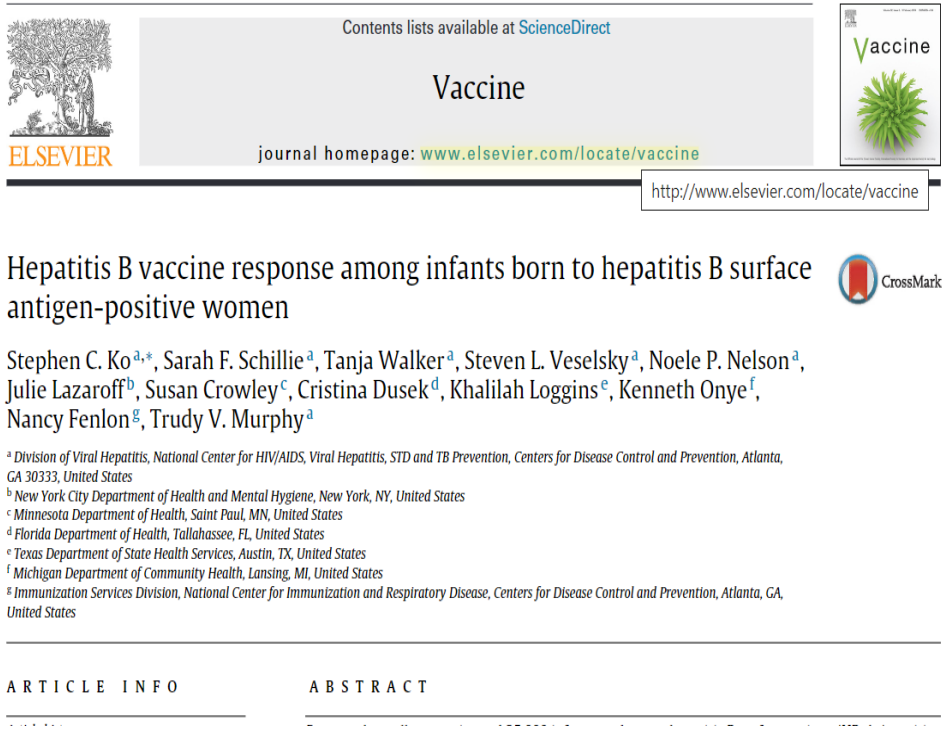
A word on revaccination

- Option B
  - Based on clinical circumstances or family preference, HBsAg-negative infants with anti-HBs <10 mIU/mL may instead be revaccinated with a second, complete 3-dose series, followed by postvaccination serologic testing performed 1–2 months after the final dose of vaccine.

- Available data do not suggest a benefit from administering additional HepB vaccine doses to infants who have not attained anti-HBs ≥10 mIU/mL following receipt of two complete HepB vaccine series.
- Both options are equally acceptable
- HBsAg-positive infants should be referred for appropriate follow-up

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31

A final warning on delaying PVST



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Vaccine

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Hepatitis B vaccine response among infants born to hepatitis B surface antigen-positive women

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[e] Texas Department of State Health Services, Austin, TX, United States
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[g] Immunization Services Division, National Center for Immunization and Respiratory Disease, Centers for Disease Control and Prevention, Atlanta, GA, United States

ARTICLE INFO

ABSTRACT

Highlights

- Ninety-five percent of uninfected infants born to HBsAg-positive mothers responded to HepB vaccine series.
- Vaccine non-response increased with longer intervals between the final vaccine dose and PVST.
- Optimal timing of PVST is 1–2 months after final vaccine dose to avoid unnecessary revaccination.

Accessed on 4/27/2022: Hepatitis B vaccine response among infants born to hepatitis B surface antigen-positive women - PubMed (nih.gov)

Putting ACIP Recommendations into practice: PVST

Putting guidance into practice: Scenario One

- Infant completes the vaccine series at 10 months of age on June 1st and gets PVST on June 14th. The PVST results are following:
  - HBsAg-positive
  - Anti-HBs-negative
  - Anti-HBc-positive
- What would you recommend as the next steps?

Scenario One: Next Steps

- Repeat PVST 1-2 months after June 1st. Per ACIP recommendations order only HBsAg and anti-HBs.
- Educate provider
- Foot notes:
  - HBsAg-positivity maybe transient. This may occur up to 18 days following vaccination. In this scenario, PVST occurred 14 days after final dose.
  - Anti-HBc testing of infants is not recommend because passively acquired maternal antibodies might be detected in infants born to HBsAg-positive mothers up to 24 months of age.

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

Putting guidance into practice: Scenario Two

- HBV-exposed infant received ACIP recommended PEP and completed hepatitis B vaccine series at 7 months and 15 days. Infant got PVST at 11 months of age with the following results:
  - HBsAg-negative and anti-HBs 6 mIU/mL
- What would you recommend as next steps?

Scenario Two: Next Steps

- Option A
  - Single dose of hepatitis B vaccine and receive PVST 1-2 months later.
  - If anti-HBs remains <10mIU/mL administer 2 additional doses to complete the second series (use ACIP schedule for timing) and repeat PVST 1-2 months after 2nd series is complete
  - If anti-HBs remain <10mIU/mL after 2nd full series. Family should be educated on how to minimize horizontal transmission
  - HBsAg-positive infants should be referred for follow-up

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

Scenario Two: Next Steps

- Option B
  - Revaccinate with complete 3 dose series, followed by PVST performed 1-2 months after the final dose of the second series
  - HBsAg-positive infants should be referred for follow-up

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.

PHBPP and COVID-19

COVID-19 and PHBPP Services (2020)

- PHBPP required strategies (objectives) are considered high priorities for immunization awardees
- CDC released interim guidance in April 2020 to address some of the identified service disruptions to PHBPP enrolled families caused by the COVID-19 pandemic
- Guidance focuses on the 3 providers types who interact with HBsAg-positive pregnant women and their HBV-exposed infants
- Link: https://www.cdc.gov/vaccines/schedules/hcp/schedule-changes.html

Accessed at: https://www.cdc.gov/vaccines/schedules/hcp/schedule-changes.html

COVID-19 and PHBPP Services (2020)Continued

- Pediatric providers
  - If post-vaccination serologic testing is delayed beyond 6 months after the hepatitis B series is completed, the provider should consider administering a “booster” dose of single antigen hepatitis B vaccine and then ordering post-vaccination serologic testing (HBsAg & antibody to HBsAg [anti-HBs]) 1-2 months after the “booster” dose

Accessed at: https://www.cdc.gov/vaccines/schedules/hcp/schedule-changes.html

National Perinatal Hepatitis B Prevention Program

Why prevention of perinatal transmission is important

- Infected infants are usually asymptomatic
- 80%-90% of infants who are infected with HBV become chronically infected
  - Compared to 12% or fewer of individuals infected at age 6 years or older
- Up to 25% of individuals chronically infected will develop cirrhosis or liver cancer and die prematurely
- It is a vaccine-preventable disease
  - Hepatitis B Immune Globulin(HBIG) with vaccine series completion is 94% effective in preventing mother-to- child transmission

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recom Rep 2018; 67 (No. RR-1):1–31.
Centers for Disease Control and Prevention. A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP);Part 1: Immunization of Infants, Children, and Adolescents .MMWR 2005;54(No. RR-16)

Perinatal hepatitis B prevention program

- Established in 1990 to identify births to HBsAg-positive persons and manage identified infants through Post Vaccination Serologic Testing (PVST)
- Funded by CDC Immunization Cooperative Agreements (Section 317 funding)
- Programs in 64 jurisdictions (50 states, 6 cities, 5 territories & 3 freely associated island nations)
- Program works collaboratively with NCHHSTP
- Program structure varies by awardees
- Program Required Strategies are based upon selected ACIP recommendations (MMWR January 12, 2018)
- MMWR link: https://www.cdc.gov/mmwr/volumes/67/rr/rr6701a1.htm

Required program strategies: (7/1/19-6/30/24)

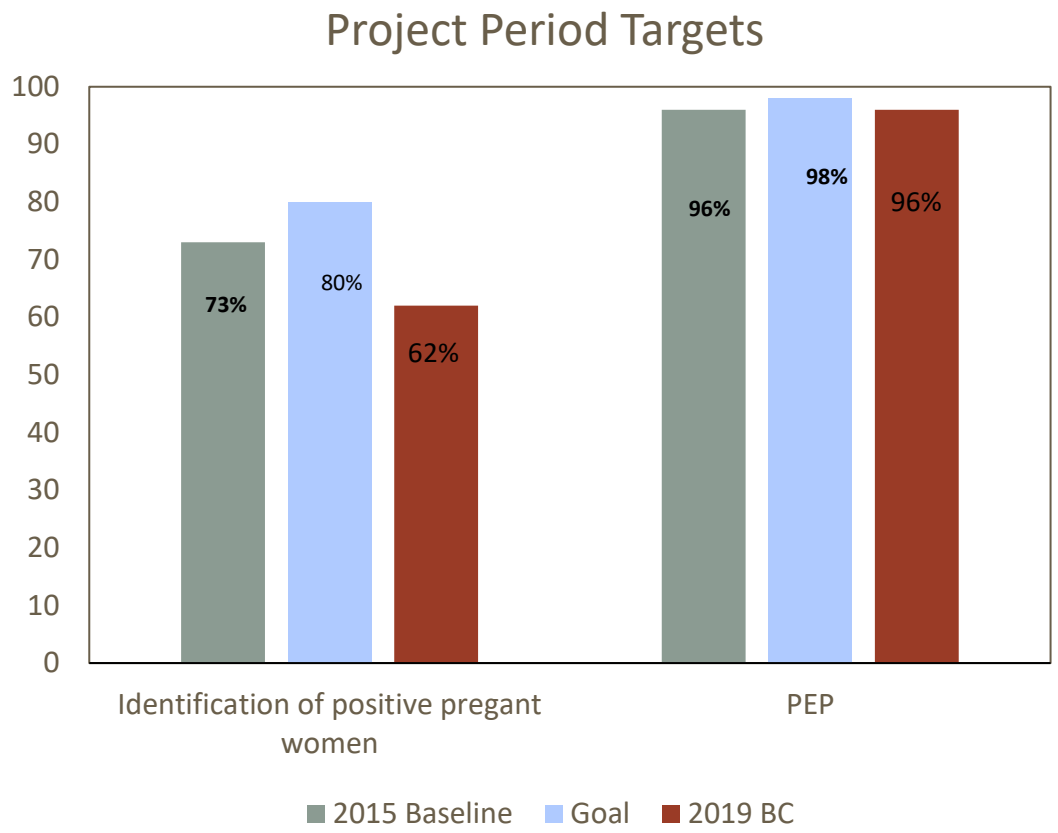
- Identify HBsAg-positive pregnant women and births to HBsAg-positive women
- Ensure hepatitis B virus (HBV)-exposed infants receive post-exposure prophylaxis (PEP)
- Ensure HBV-exposed infants complete the hepatitis B vaccine series and receive post-vaccination serologic testing (PVST)(per ACIP recommendation)

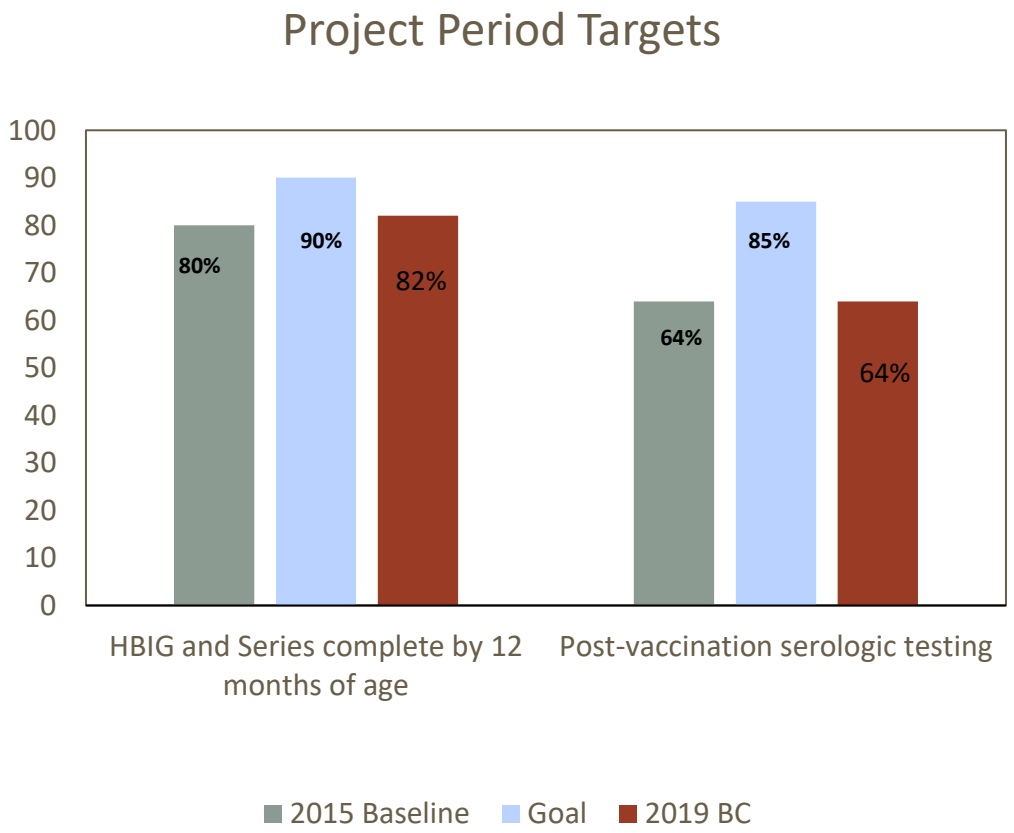
National Notifiable Disease Surveillance System (NNDSS): Perinatal hepatitis B case definition

- Perinatal hepatitis B is a notifiable disease via NNDSS
- Confirmed
  - Child born in the United States to a HBV-infected mother and infant is positive for HBsAg at ≥ 1 month of age and ≤ 24 months of age OR positive for HBeAg or HBV DNA ≥9 months of age and ≤ 24 months of age.
- Probable
  - Child born in the United States and infant is positive for HBsAg at ≥ 1 month of age and ≤ 24 months of age OR positive for HBeAg or HBV DNA ≥9 months of age and ≤ 24 months of age, but whose mother's hepatitis B status is unknown (i.e. epidemiologic linkage not present).

CDC. Available at: https://wwwn.cdc.gov/nndss/conditions/hepatitis-b-perinatal-virus-infection/case-definition/2017/

Project Period Targets

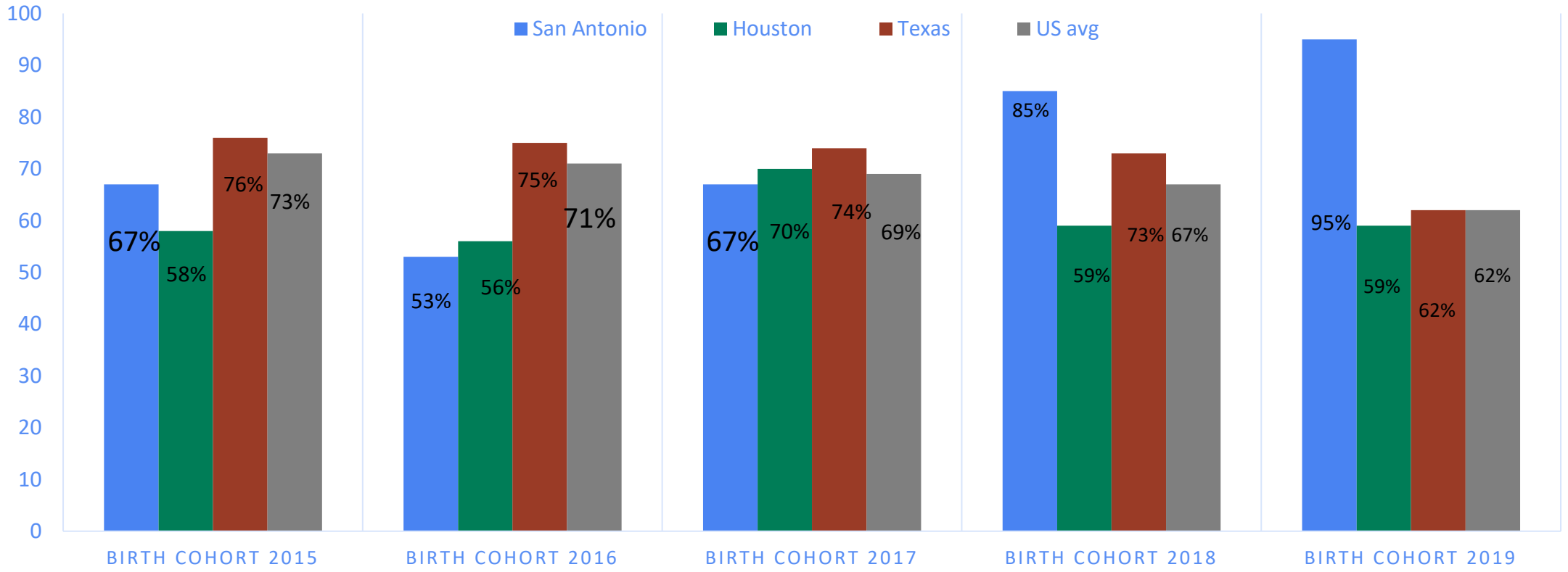




Chapter H Perinatal Hepatitis B Prevention Program, 2022 IPOM

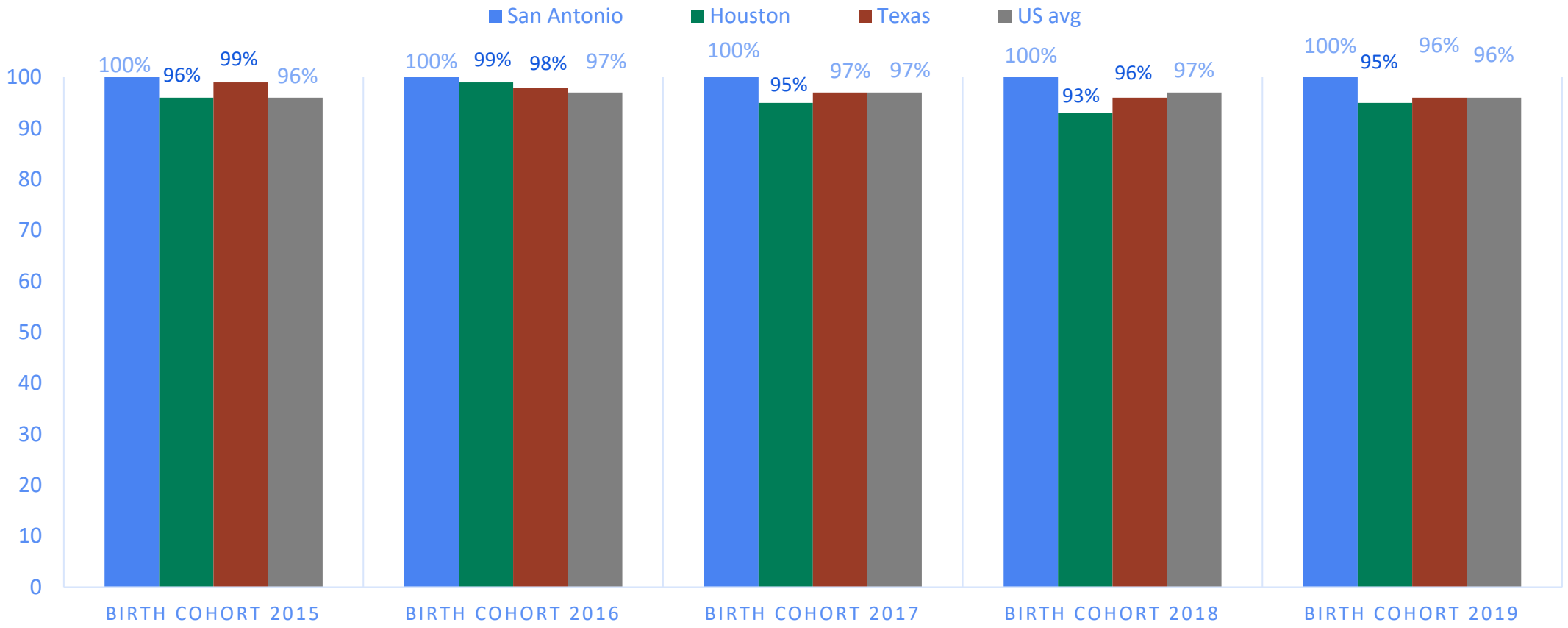
Outcomes Compared to Targets

Texas Awardees Outcomes: Identification HBsAg-positive births (Target: 80%)



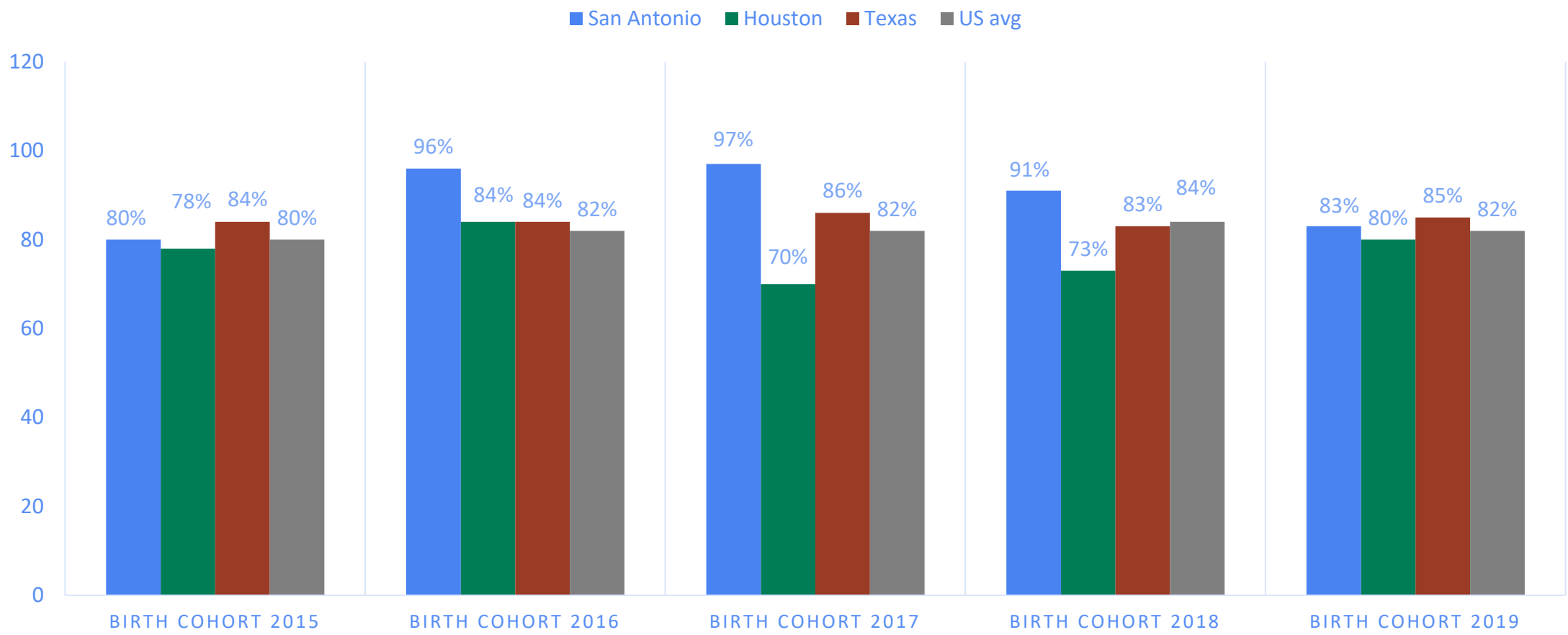
CDC Annual Report 2016-2020 unpublished data

Texas Awardees Outcomes: Post-exposure Prophylaxis (PEP) at birth (Target: 98%)



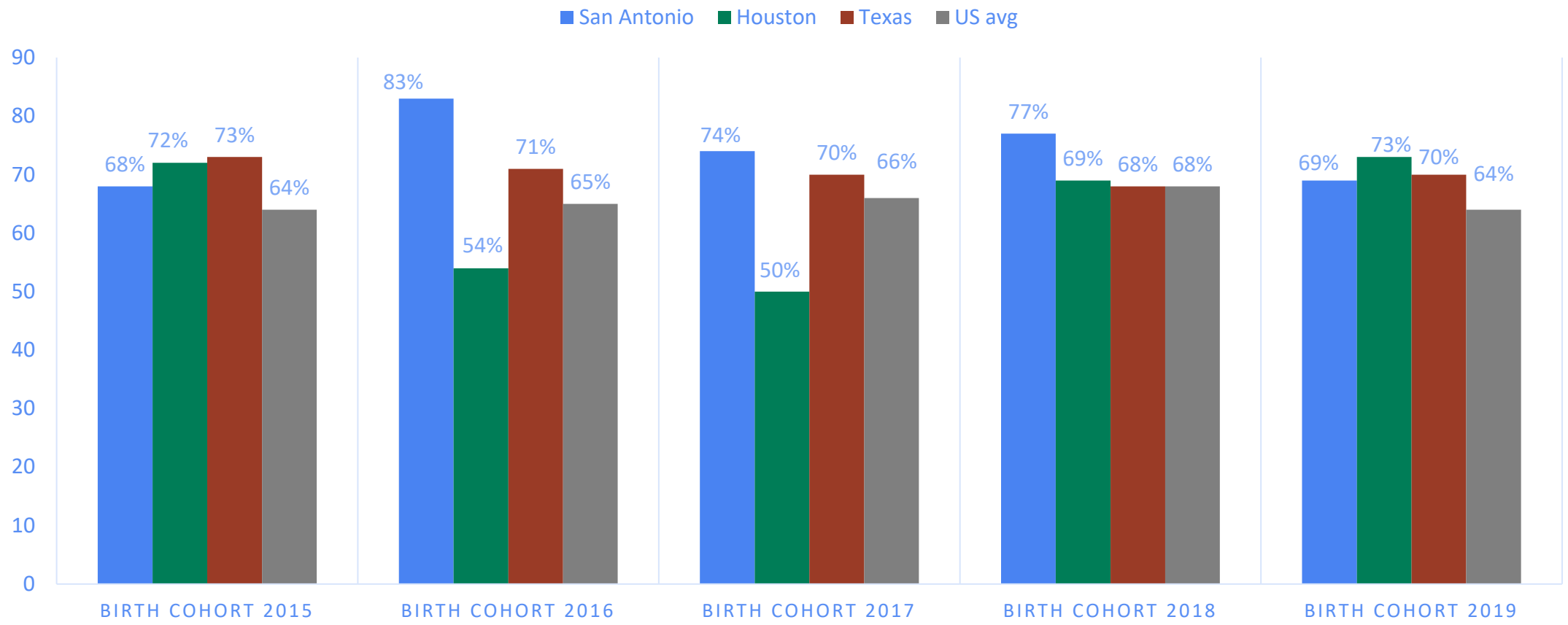
CDC Annual Report 2016-2020 unpublished data

Texas Awardees Outcomes: HBIG and Hep B vaccine series complete by 12 months (Target: 90%)



CDC Annual Report 2016-2020 unpublished data

Texas Awardees Outcome: Post Vaccination Serologic Testing (Target: 85%)



CDC Annual Report 2016-2020 unpublished data

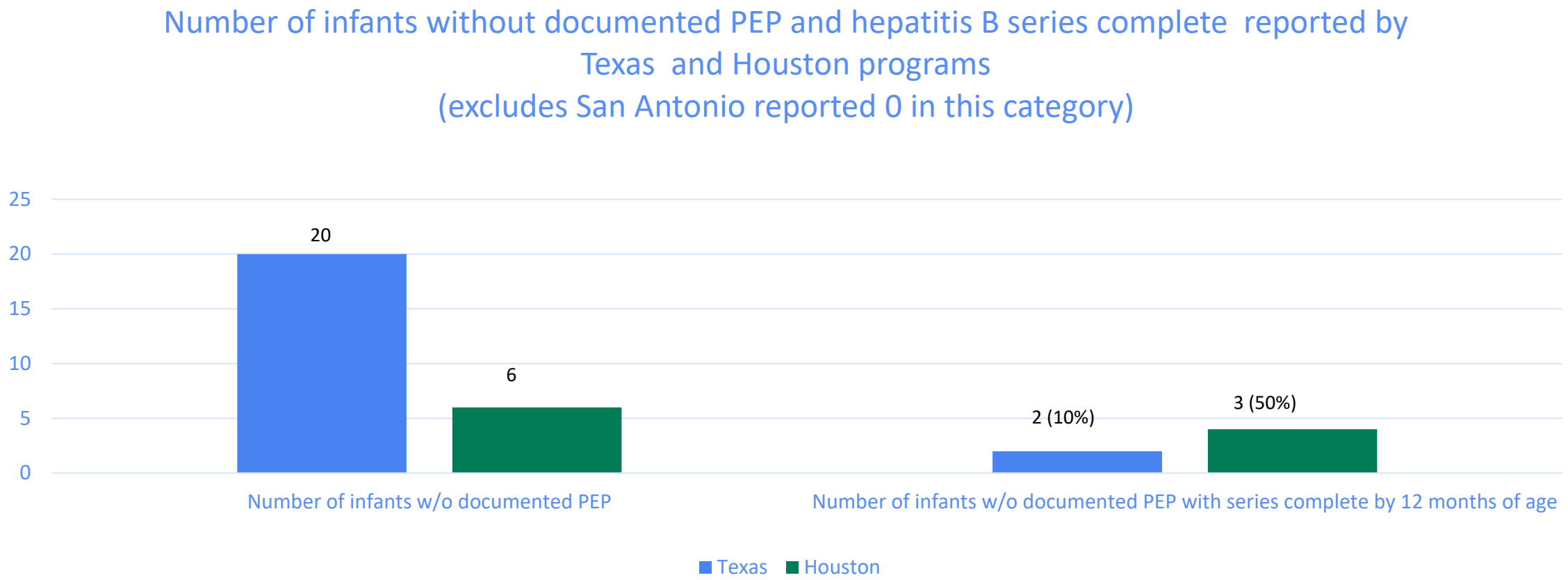
Special populations

Outcomes of infants without documented PEP at birth

Birth Cohort	Infants without document PEP at birth	Infants with series complete by 12 months of age	Infants with series complete after 12 months by end of report period 1	Total with series complete	PVST by end of report period 1	HBsAg-positive
2015	437	276	12	288	161	0
2016	403	231	16	247	136	3
2017	365	257	5	262	164	3
2018	321	234	6	240	130	2
2019	349	180	13	193	105	2

CDC Annual Report 2016-2020 unpublished data

2019 Birth Cohort without documentation of PEP: Texas and Houston



CDC Annual Report 2020 unpublished data

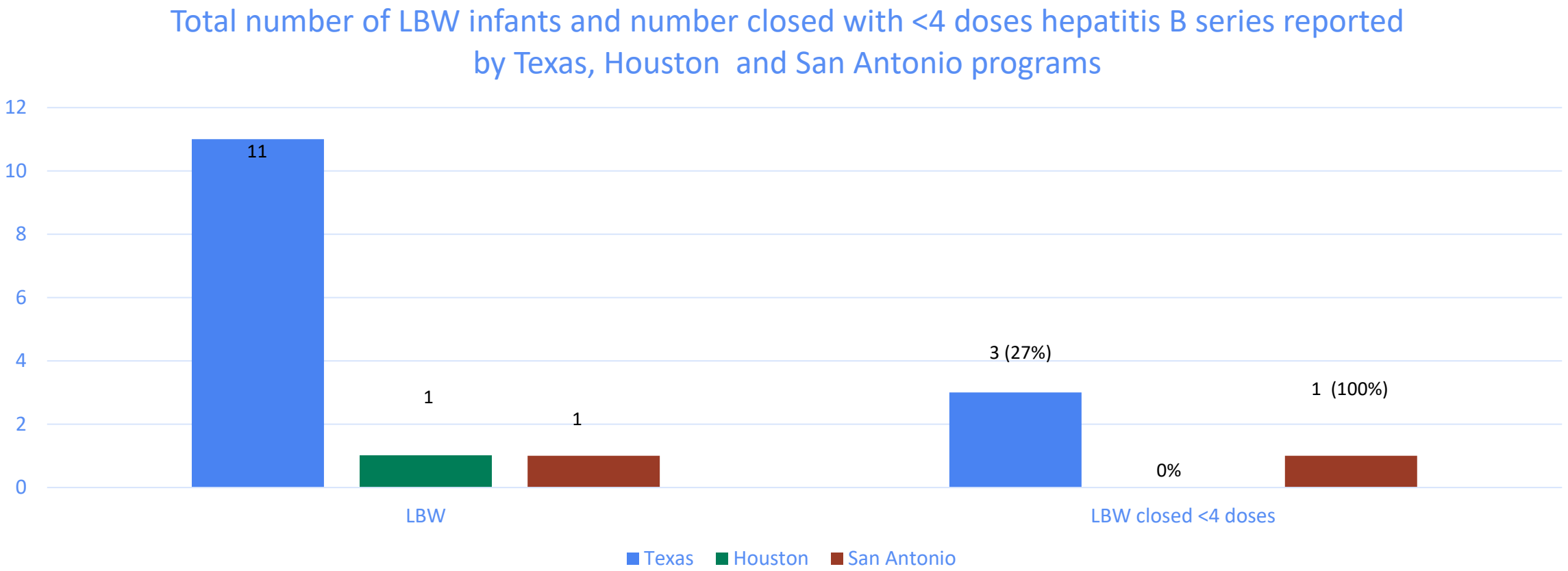
Low Birth Weight

- The Low Birth Weight (LBW) Questions became required question with 2014 Birth Cohort (Annual Report due spring 2016)
- LBW infants = birth weight <2,000 grams

Birth Cohort	Awardees with No LBW infants reported	Total #LBW infants reported	Percent of LBW infants closed w/o 4 doses of Hep B vaccine
2015	20	183	11%
2016	21	274	24%
2017	19	256	23%
2018	22	260	15%
2019	23	242	20%

CDC Annual Report 2016-2020 unpublished data

2019 Birth Cohort Low Birth Weight Infants: Texas, Houston, and San Antonio

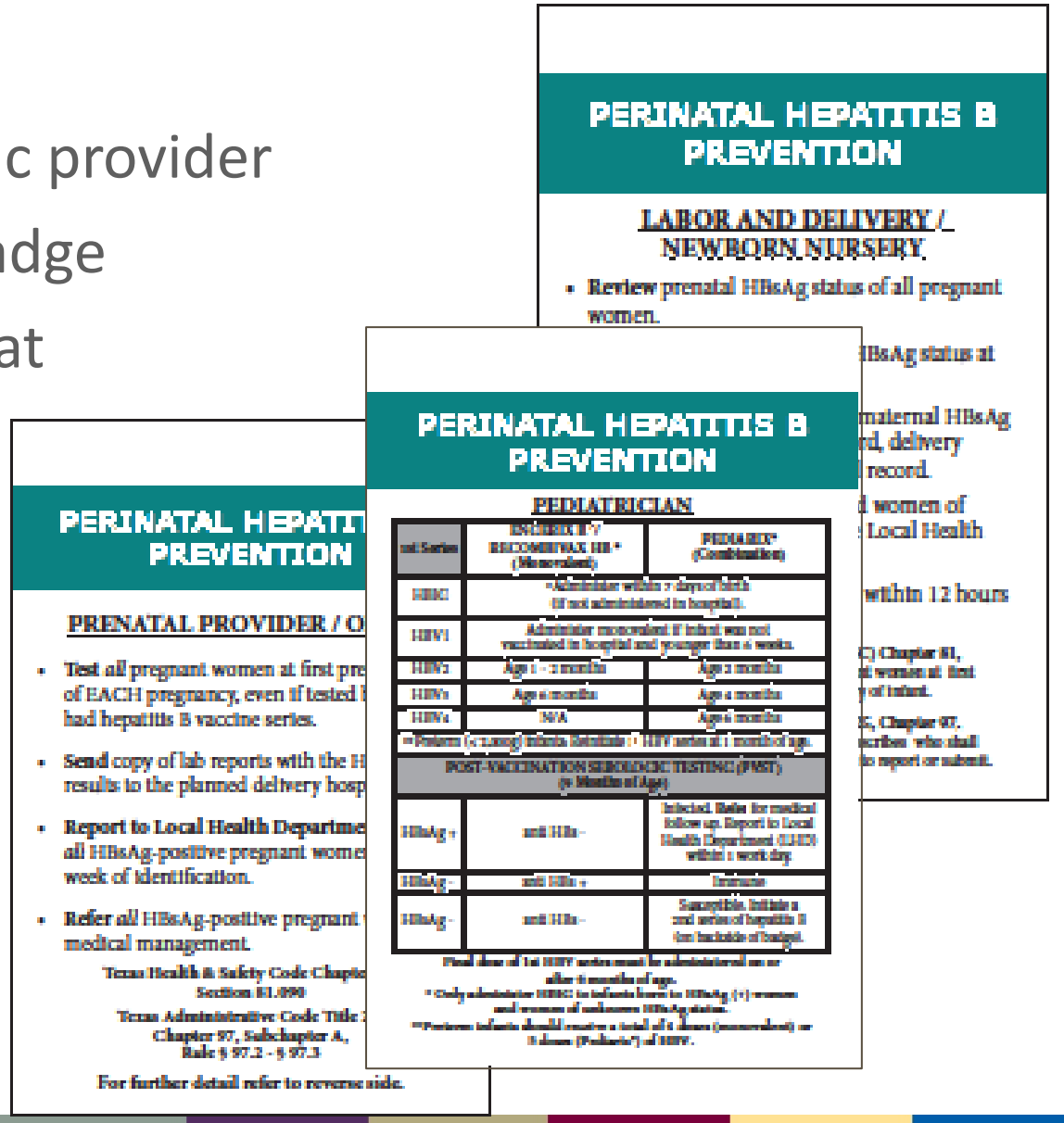


CDC Annual Report 2020 unpublished data

Best Practices and Resources

Badge Buddies: Texas

- Quick reference guide targeted to specific provider
- Easily access designed to fit behind ID badge
- Larger size could fit into pocket of lab coat
- Free educational giveaway
- Cost of development covered by Co-Ag
- Under $3500 to print 10,000 each type
- Improved visibility of program & PVST



*Not to scale.

Content of slide based on R. Wiseman slides RSV, Atlanta GA, June 2017

Capture Recapture: Philadelphia

- Data from:
  - Perinatal Hepatitis B Prevention Program
  - HBV Surveillance Registry
  - Electronic Birth Certificates
- Time period: 2008-2014
- Birth certificate data matched to HBV surveillance and then matched to PHBPP data
- Newly identified if:
  - No PHBPP match
  - >=2 Positive HBV tests indicative of current infection
  - Tests were prior to delivery with>= 6 months apart or 1 positive HBV test result during pregnancy and no subsequent negative HBsAg test results

Kunico, D.E., et al. Capture-Recapture: Using Existing Data Sources to Improve Perinatal Hepatitis B Surveillance, Philadelphia, 2008-2014. Public Health Reports 2017;132(3)376-380.

Capture Recapture: Philadelphia

- Reasons for missed identification opportunities of newly identified cases (n=358)
- Most Common was Internal Administrative Error (n=191, 53.4%)
  - Protocol execution failure
  - Delayed referral to PHBPP from other departments
- No or inadequate testing during pregnancy (n=81, 22.6%)
- Mother-infant pairs lost to follow up (n=75, 22.6%)
- HBV lab results not reported (n=11, 3.1%)
- Addressed internal issues
- For the 2019 birth cohort, program identified 108% of the Lower Limit of expected births

Kunico, D.E., et al. Capture-Recapture: Using Existing Data Sources to Improve Perinatal Hepatitis B Surveillance, Philadelphia, 2008-2014. Public Health Reports 2017;132(3)376-380.

CDC unpublished data 2020 PHBPP Annual Report

Public Health Rep. May/Jun 2020;135(3):322-328. doi: 10.1177/0033354920913063.
Epub 2020 Apr 8.

Use of Capture-Recapture Analysis to Assess Reporting Completeness of Births to Hepatitis B-Positive Women in New York City, 2013-2014

Katelynn Devinney [1 2], Julie Lazaroff [1], Jennifer B Rosen [1], Christopher M Zimmerman [1], Jane R Zucker [1 3]

Affiliations + expand

PMID: 32267800 PMCID: PMC7238707 DOI: 10.1177/0033354920913063

Public Health Rep. May/Jun 2017;132(3):376-380. doi: 10.1177/0033354917702851.
Epub 2017 Apr 13.

Capture-Recapture: Using Existing Data Sources to Improve Perinatal Hepatitis B Surveillance, Philadelphia, 2008-2014

Danica E Kuncio [1], E Claire Newbern [1], Liyuan Ma [1], Robbie Madera [1], Bruce Barlow [1], S Ginny Robison [1], Kendra M Viner [1], Caroline C Johnson [1]

Affiliations + expand

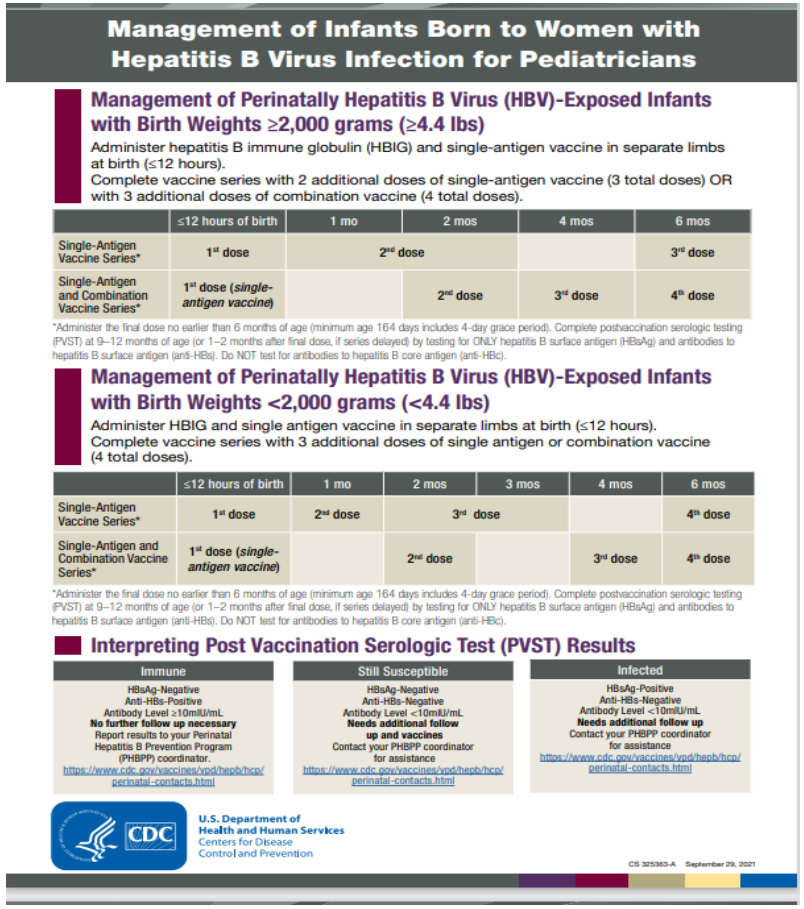
PMID: 28406735 PMCID: PMC5415262 DOI: 10.1177/0033354917702851

Free PMC article

HBIG Billing Data: D.C.

- Contacts Director of Pharmacy for birthing hospitals in DC
  - Obtains information on infants with HBIG billed to their accounts
  - Matches infant with mother via Vital Statistics
- Contacts hospital/provider for HBsAg status and infant's medication record, demographic information for unmatched infants
- Obtains data on quarterly
- Intervention assisted program in increasing identified birth
- Other programs have adopted this practice with success

CDC Pediatric Tip Sheet



Management of Infants Born to Women with Hepatitis B Virus Infection for Pediatricians

Management of Perinatally Hepatitis B Virus (HBV)-Exposed Infants with Birth Weights ≥2,000 grams (≥4.4 lbs)

Administer hepatitis B immune globulin (HBIG) and single-antigen vaccine in separate limbs at birth (≤12 hours).
Complete vaccine series with 2 additional doses of single-antigen vaccine (3 total doses) OR with 3 additional doses of combination vaccine (4 total doses).

	≤12 hours of birth	1 mo	2 mos	4 mos	6 mos
Single-Antigen Vaccine Series*	1st dose	2nd dose			3rd dose
Single-Antigen and Combination Vaccine Series*	1st dose (*single-antigen vaccine*)		2nd dose	3rd dose	4th dose

*Administer the final dose no earlier than 6 months of age (minimum age 164 days includes 4-day grace period). Complete postvaccination serologic testing (PVST) at 9–12 months of age (or 1–2 months after final dose, if series delayed) by testing for ONLY hepatitis B surface antigen (HBsAg) and antibodies to hepatitis B surface antigen (anti-HBs). Do NOT test for antibodies to hepatitis B core antigen (anti-HBc).

Management of Perinatally Hepatitis B Virus (HBV)-Exposed Infants with Birth Weights <2,000 grams (<4.4 lbs)

Administer HBIG and single antigen vaccine in separate limbs at birth (≤12 hours).
Complete vaccine series with 3 additional doses of single antigen or combination vaccine (4 total doses).

	≤12 hours of birth	1 mo	2 mos	3 mos	4 mos	6 mos
Single-Antigen Vaccine Series*	1st dose	2nd dose	3rd dose			4th dose
Single-Antigen and Combination Vaccine Series*	1st dose (*single-antigen vaccine*)		2nd dose		3rd dose	4th dose

*Administer the final dose no earlier than 6 months of age (minimum age 164 days includes 4-day grace period). Complete postvaccination serologic testing (PVST) at 9–12 months of age (or 1–2 months after final dose, if series delayed) by testing for ONLY hepatitis B surface antigen (HBsAg) and antibodies to hepatitis B surface antigen (anti-HBs). Do NOT test for antibodies to hepatitis B core antigen (anti-HBc).

Interpreting Post Vaccination Serologic Test (PVST) Results

Immune	Still Susceptible	Infected
HBsAg-Negative Anti-HBs-Positive Antibody Level ≥10mIU/mL **No further follow up necessary** Report results to your Perinatal Hepatitis B Prevention Program (PHBPP) coordinator. https://www.cdc.gov/vaccines/vpd/hepb/hcp/perinatal-contacts.html	HBsAg-Negative Anti-HBs-Negative Antibody Level <10mIU/mL **Needs additional follow up and vaccines** Contact your PHBPP coordinator for assistance https://www.cdc.gov/vaccines/vpd/hepb/hcp/perinatal-contacts.html	HBsAg-Positive Anti-HBs-Negative Antibody Level <10mIU/mL **Needs additional follow up** Contact your PHBPP coordinator for assistance https://www.cdc.gov/vaccines/vpd/hepb/hcp/perinatal-contacts.html

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

CS 325363-A September 29, 2021

Hepatitis B Virus FAQs

What is hepatitis B virus (HBV)?

Hepatitis B is an infectious liver disease. The infection can be acute or chronic. Chronic infections can lead to cirrhosis, liver cancer, and premature death. Though usually asymptomatic, most infants (90%) who are infected with HBV will develop chronic infection and 25% will die prematurely from liver cancer or cirrhosis. HBV is transmitted through contact with infectious blood or body fluids or from a person who is infected (HBsAg+) to their newborn during delivery.

Can perinatal transmission be prevented?

Yes, perinatal transmission can be prevented by screening for HBsAg during every pregnancy. Infants born to HBsAg+ women should receive HBIG and a dose of single-antigen hepatitis B vaccine ≤12 hours of birth, followed by a complete series of hepatitis B vaccine, which is up to 94% effective in preventing perinatal transmission.

What if my practice identifies a Perinatally HBV-exposed newborn that did not receive HBIG before hospital discharge?

The infant should receive an urgent referral to receive HBIG, which can be administered up to 7 days after birth. If more than 7 days have passed, HBIG is unlikely to be effective in preventing transmission. However, it is still important for the infant to complete the hepatitis B vaccine series, and providers should adhere to the minimum intervals between doses.

What is postvaccination serologic testing (PVST) and why is it necessary?

Postvaccination serologic testing (PVST) is recommended for infants and children born to women with hepatitis B infection. Serologic testing confirms whether the child has developed immunity or has been infected with HBV. PVST should include hepatitis B surface antigen (HBsAg) and hepatitis B surface antibody (anti-HBs) only. PVST should occur between 9–12 months of age or 1–2 months after vaccine series completion, if the series is delayed. Note: Tests for antibodies to hepatitis B core antigen (anti-HBc) should *not* be ordered.

Why aren't antibodies to hepatitis B core antigen (anti-HBc) included in PVST?

A positive anti-HBc test result indicates a past or current hepatitis B infection. In infants, a positive anti-HBc test may result from measuring passively acquired maternal antibodies that are detectable in HBV-exposed infants up to 24 months of age.

Why must providers wait until the infant is 9 months of age to perform PVST?

Testing performed before 9 months of age can provide inaccurate anti-HBs results by detecting passive antibodies from HBIG administered at birth rather than actual response to the hepatitis B vaccine. Also, for infants who receive HBIG at birth, there can be a prolonged HBV incubation period. Waiting until 9 months of age can maximize detection of late HBV infection if present.

If vaccine series completion is delayed and I am concerned that the infant will NOT return for PVST, can I perform testing immediately after completing the vaccine series?

No, transient HBsAg positivity has been reported for up to 18 days after vaccination. To assure accurate PVST results, the test must be conducted at 9–12 months of age or 1–2 months after vaccine series completion if the series is delayed.

Can PVST be delayed until the infant is older?

No, anti-HBs concentrations decline rapidly within the first year after the series is completed. Delaying PVST beyond the recommended time frame may yield a negative/non-reactive anti-HBs result, making it difficult to determine if immunity has waned or vaccine has failed. This ambiguity may lead to unnecessary revaccination. For this reason, providers are encouraged to test at 9–12 months of age or 1–2 months after vaccine series completion if the series is delayed.

Is assistance available for management of HBV-exposed infants?

Yes, CDC provides funding and technical assistance for perinatal hepatitis B prevention programs (PHBPPs) in all 50 states and 14 other jurisdictions. All Perinatally HBV-exposed infants should be managed by the PHBPP. To find contact information for the perinatal hepatitis B prevention program coordinator in your area, please go to: https://www.cdc.gov/vaccines/vpd/hepb/hcp/perinatal-contacts.html

PHBPP Coordinator contact information:

CDC Tip Sheet is adapted with permission from the Georgia Department of Public Health publication, "A Pediatric Guide: Caring for Infants Born to Hepatitis B-Infected Mothers."

*Reference: *MMWR*, January 12, 2018, Vol 67,(1);1–31, Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. https://www.cdc.gov/mmwr/volumes/67/rr/rr6701a1.htm

[Management of Infants Born to Women with Hepatitis B Virus Infection for Pediatricians (cdc.gov)]

Additional Resources

- **2018 ACIP Recommendations**
  - https://www.cdc.gov/mmwr/volumes/67/rr/pdfs/rr6701-H.pdf
- CDC Perinatal Webpages
  - Perinatal Hepatitis B Prevention Program | CDC
  - Perinatal Transmission of Hepatitis B virus | CDC
- **IAC Website: Birth dose initiative**
  - http://www.immunize.org/protect-newborns/
- **CDC Pink Book**
  - http://www.cdc.gov/vaccines/pubs/pinkbook/hepb.html
- **Asian Liver Center**
  - http://liver.stanford.edu/
- **HHS Viral Hepatitis Action Plan (2021-2025)**
- Viral Hepatitis National Strategic Plan for the United States: A Roadmap to Elimination (2021-2025) (hhs.gov)

Acknowledgements

- Texas Immunization Program
- Philadelphia Immunization Program
- D.C. Immunization Program
- Immunization Services Division/NCIRD/CDC
- Division of Viral Hepatitis/NCHHSTP/CDC
- Contact Information
  - Nancy Fenlon ncf1@cdc.gov

Universal Hepatitis B Vaccination in Adults Aged 19–59 Years: Updated Recommendations of the Advisory Committee on Immunization Practices — United States, 2022

LCDR Mark K. Weng, MD, MSc

Prevention Branch, Division of Viral Hepatitis

2022 Texas Perinatal Hepatitis B Prevention Program Meeting

May 20, 2022

Updated Hepatitis B Recommendations (as of Nov 2021)

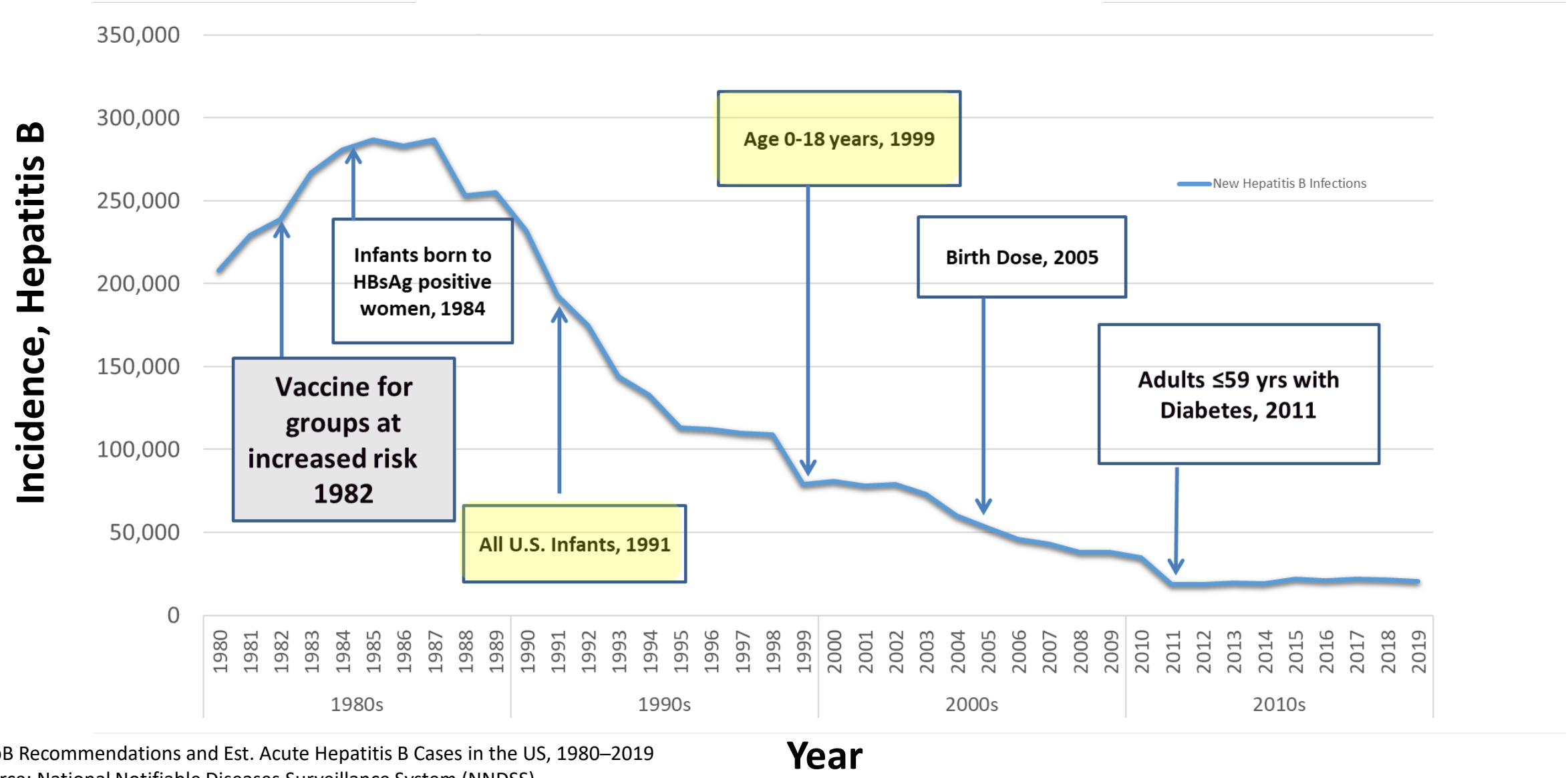
The Advisory Committee on Immunization Practices (ACIP) recommends the following groups **should** receive hepatitis B vaccines:

- Adults aged 19–59 years
- Adults aged ≥60 years with risk factors for hepatitis B

The ACIP recommends the following groups **may** receive hepatitis B vaccines:

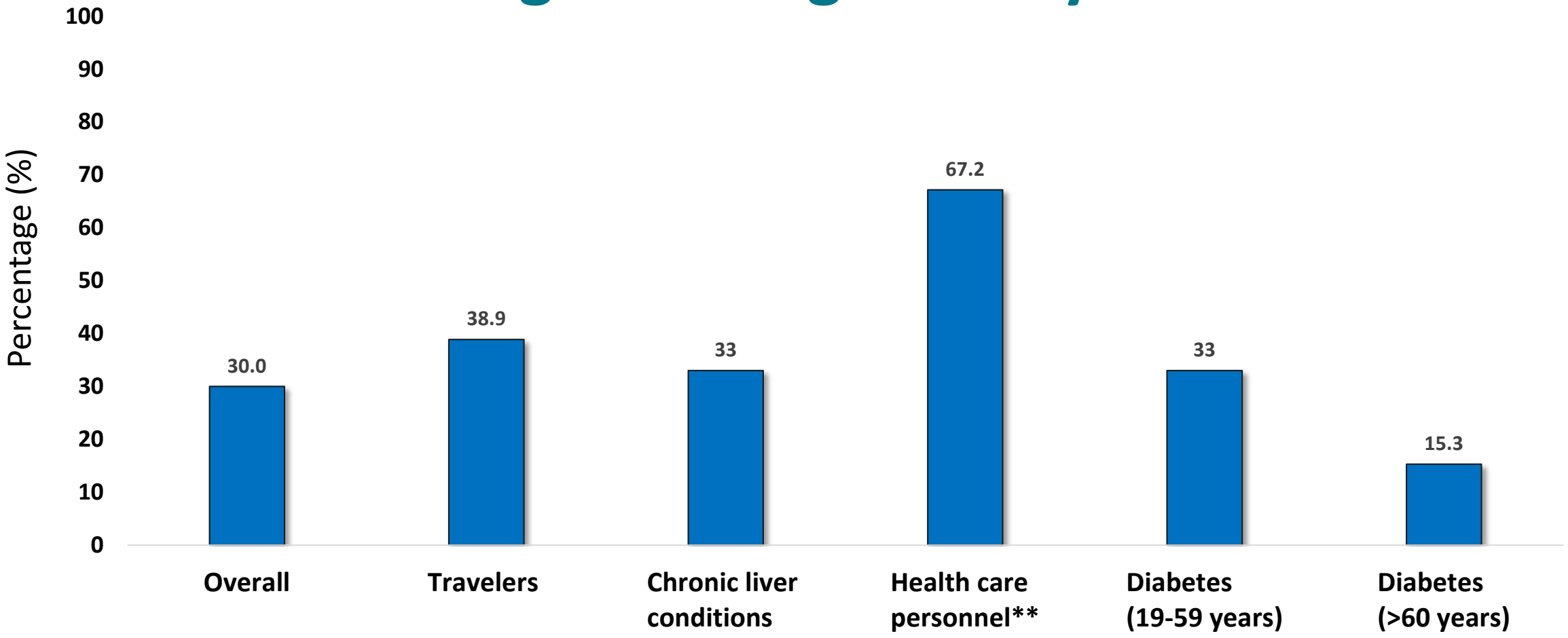
- Adults aged ≥60 years without known risk factors for hepatitis B

The hepatitis B immunization strategy evolves



HepB Recommendations and Est. Acute Hepatitis B Cases in the US, 1980–2019
Source: National Notifiable Diseases Surveillance System (NNDSS)

Hepatitis B vaccine coverage (≥3 doses) among adults aged ≥19 years*



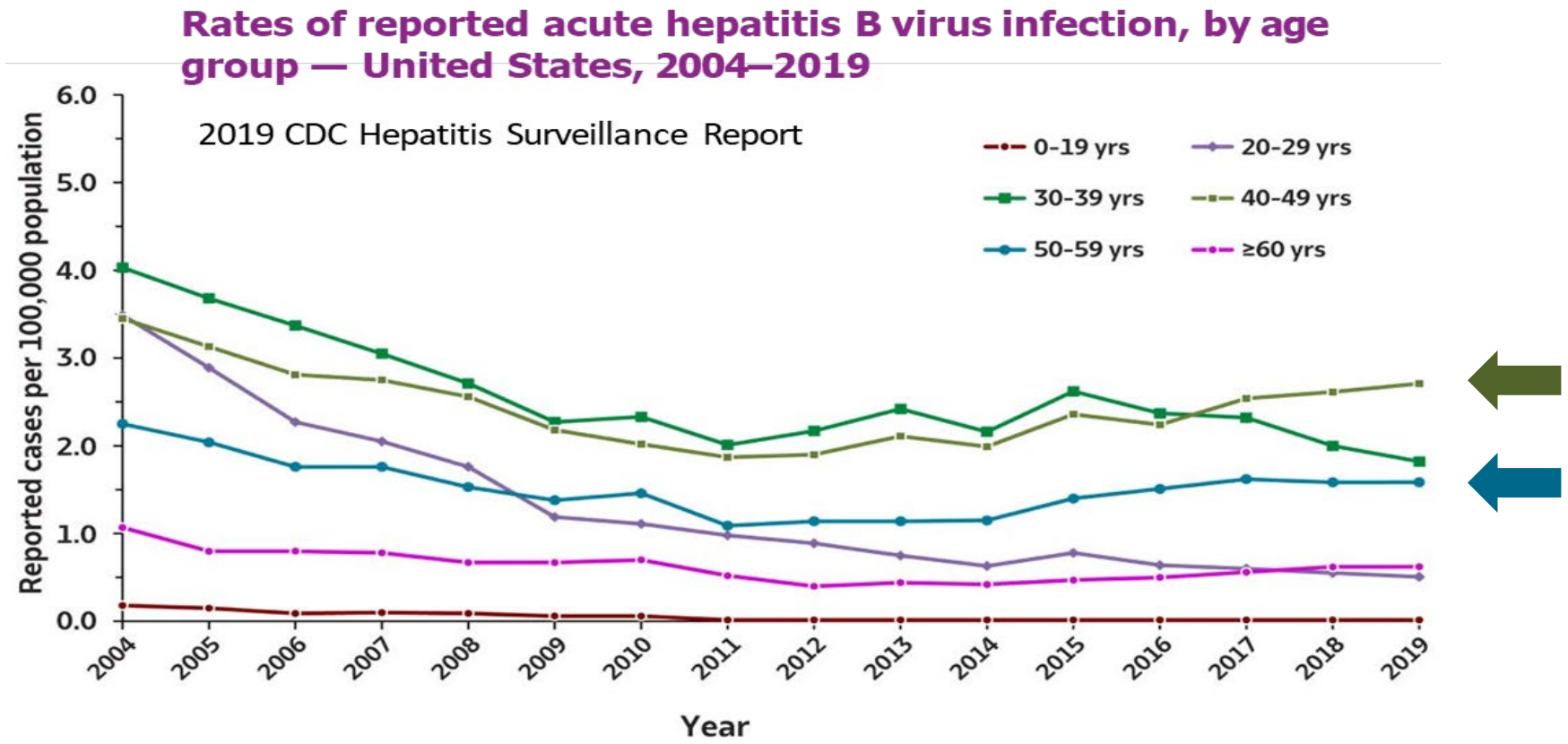
* For adults with diabetes categories: 19-59 years and 60+ years

** Refers to health care personnel (HCP) overall; 75.3% vaccination rate among HCP with direct patient care; 50.9% among HCP without direct patient care

Source: Lu, et al. MMWR, 2018.

Risk-based hepatitis B immunization among adults: a partial success

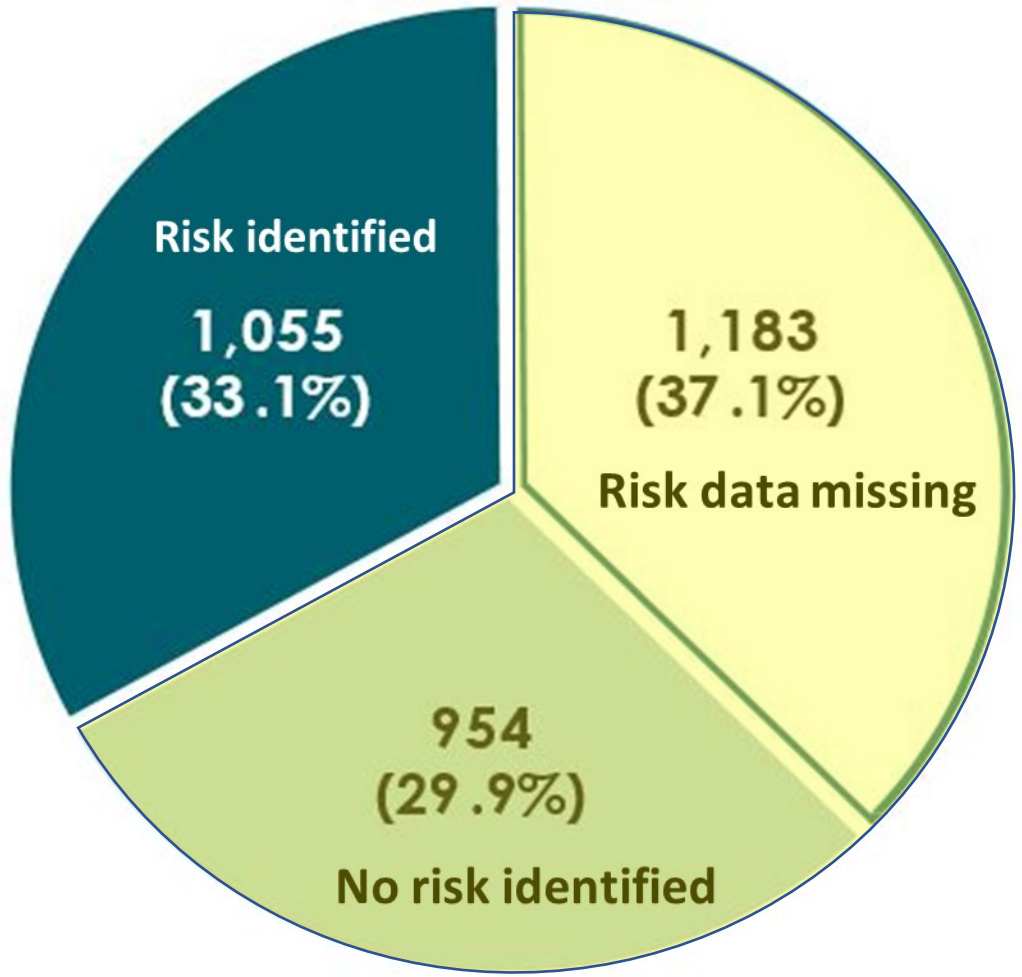
- Initial decreases in new hep B infections plateaued 10 years ago
- Rates are now highest among adults
- Rates have *increased* among adults ≥40 years of age



Source: https://www.cdc.gov/hepatitis/statistics/2019surveillance/pdfs/2019HepSurveillanceRpt.pdf

Limitations of a risk-based approach

Availability of information regarding risk behaviors or exposures associated with reported cases of acute hepatitis B virus infection — United States, 2019



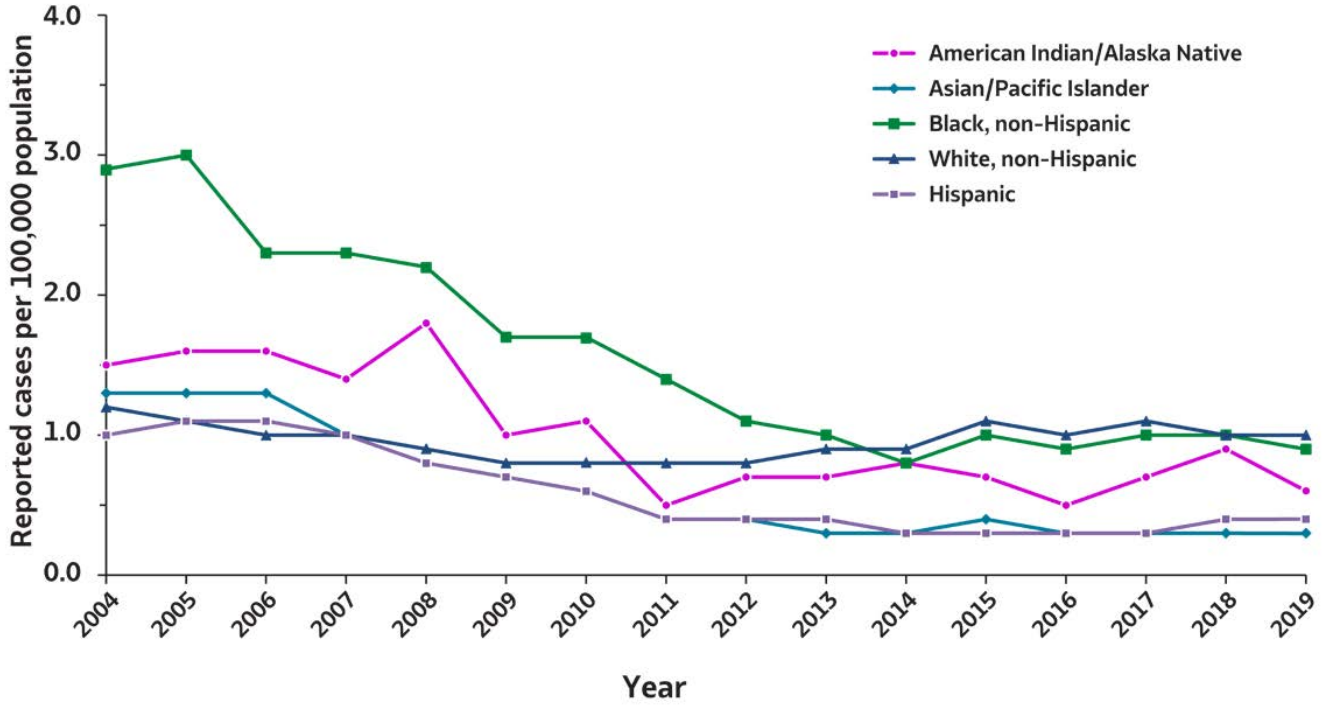
2/3 of reported cases were either missing risk data or reported no identified risk

Source: https://www.cdc.gov/hepatitis/statistics/2019surveillance/index.htm

Health equity: Disparities could be reduced with a universal adult HepB recommendation

- Rates of HBV infection for children and adolescents of all races/ethnicities converged to a lower rate when a universal vaccination strategy was implemented for children ≤18y. [1, 2]
- Current rates among Black American adults are now up to 3x those of Asian/Pacific Islander and Hispanic groups.[1]
- Racial/ethnic disparities remain in hepatitis B virus infections.

Rates of reported acute HBV infections, by race/ethnicity—United States, 2004–2019



[1] https://www.cdc.gov/hepatitis/statistics/2019surveillance/HepB.htm

[2] Wasley et al. MMWR. 2008

Simplifying a complex hepatitis B vaccination schedule

Persons recommended to receive hepatitis B vaccination

Existing Recommendations

Schillie, et al., 2018

- **All infants**
- **Unvaccinated children aged <19 years**
- **Persons at risk for infection by sexual exposure**
  - Sex partners of hepatitis B surface antigen (HBsAg)–positive persons
  - Sexually active persons who are not in a long-term, mutually monogamous relationship (e.g., persons with more than one sex partner during the previous 6 months)
  - Persons seeking evaluation or treatment for a sexually transmitted infection
  - Men who have sex with men
- **Persons at risk for infection by percutaneous or mucosal exposure to blood**
  - Current or recent injection-drug users
  - Household contacts of HBsAg-positive persons
  - Residents and staff of facilities for developmentally disabled persons
  - Health care and public safety personnel with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids
  - Hemodialysis patients and predialysis, peritoneal dialysis, and home dialysis patients
  - Persons with diabetes aged 19–59 years; persons with diabetes aged ≥60 years at the discretion of the treating clinician
- **Others**
  - International travelers to countries with high or intermediate levels of endemic hepatitis B virus (HBV) infection (HBsAg prevalence of ≥2%)
  - Persons with hepatitis C virus infection
  - Persons with chronic liver disease (including, but not limited to, persons with cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an alanine aminotransferase [ALT] or aspartate aminotransferase [AST] level greater than twice the upper limit of normal)
  - Persons with HIV infection
  - Incarcerated persons
- **All other persons seeking protection from HBV infection**

New Recommendations

The ACIP recommends the following groups <u>should</u> receive hepatitis B vaccines:

- All infants [No change]
- Persons aged <19 years [No change]
- Adults aged 19–59 years
- Adults aged ≥60 years with risk factors for hepatitis B

The ACIP recommends the following group <u>may</u> receive hepatitis B vaccines:

- Adults aged ≥60 years without known risk factors for hepatitis B

Approved by unanimous vote
November 3, 2021

Source: Weng, et al. MMWR, 2022.

ACIP Policy Statement for PreHevbrio, added February 2022

Recommendation	PreHevbrio may be used as a HepB vaccine in persons aged ≥18 years recommended for vaccination against HBV infection.
Additional Considerations	**Persons on hemodialysis, pregnant persons and persons who are breastfeeding are not discussed in this Evidence to Recommendations Framework.** The safety and effectiveness of PREHEVBRIO have not been established in adults on hemodialysis. There are no adequate and well-controlled studies of PREHEVBRIO in pregnant women. Available human data on PREHEVBRIO administered to pregnant women are insufficient to inform vaccine-associated risks in pregnancy. Data are not available to assess the effects of PREHEVBRIO on the breastfed infant or on milk production/excretion.

Source: Weng, et al. MMWR, 2022.

Heplisav-B and PreHevbrio in Dialysis and Pregnancy

- **Safety and effectiveness of Heplisav-B and PreHevbrio have not been established in adults on hemodialysis**
- **Data on Heplisav-B and PreHevbrio are currently insufficient to inform vaccine-associated risks in pregnancy**
- **Data are not available to assess the effects of Heplisav-B and PreHevbrio on the breastfed infant or on milk production/excretion**

FDA package inserts: Heplisav-B (2017) and PreHevbrio (2021)

Adult hepatitis B vaccines

Adult hepatitis B vaccine[1]	Derivation	Adjuvant	Dose of HBs Antigens	Schedule
PreHevbrio[2]	mammalian (Chinese hamster ovary) cell	alum	10µg	3 doses at 0, 1, 6 months
Engerix-B	yeast	alum	20µg	3 doses at 0, 1, 6 months
Recombivax HB	yeast	alum	10µg	3 doses at 0, 1, 6 months
Heplisav-B	yeast	CpG 1018	20µg	2 doses at 0, 1 months

Twinrix (HepA-HepB combination vaccine) not shown.

[1] See ACIP Recommended Immunization Schedule for Adults Aged 19 Years or Older — United States, 2022 for dosing details (http://dx.doi.org/10.15585/mmwr.mm7107a1).
[2] ACIP approval February 2022

Summary

HHS and NASEM[1] have called for viral hepatitis elimination

- **Evidence supports where universal recommendations are preferred over risk-based vaccination approaches**

- **More vaccine tools available than when risk-based policy was first recommended**
  - Two 3-dose monovalent vaccines are available; safe, effective with long-term immunogenicity (>35 y)
  - One 2-dose vaccine is available; safe and effective
  - One 3-dose, 3-antigen vaccine was recently approved

- **Universal hepatitis B vaccination recommendation among adults will provide best chance of achieving HBV elimination goals**

[1] National Academies of Science, Engineering, and Medicine. https://www.nationalacademies.org/our-work/a-national-strategy-for-the-elimination-of-hepatitis-b-and-c

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Thank you

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.

Q&A

BREAK

Hepatitis B Perinatal Prevention

Catherine Freeland, Ph.D. (c), MPH

Public Health Program Director, **Hepatitis B Foundation**

HEPATITIS B FOUNDATION
www.hepb.org

HEPATITIS B PERINATAL PREVENTION

Catherine Freeland, Ph.D. (c), MPH

Public Health Program Director

Hepatitis B Foundation

Alice Chan, Storyteller

OUTLINE

- Storytelling Program and Storyteller
- Tiers of Hep B MTC Prevention
- Overview of Hepatitis B Foundation
- Successful partner programs
  - Hep B Moms
  - Philadelphia Enhanced Education
- Hep B ECHO Provider Training
- International Programs
- Resources for your practice

#JUSTB STORYTELLING

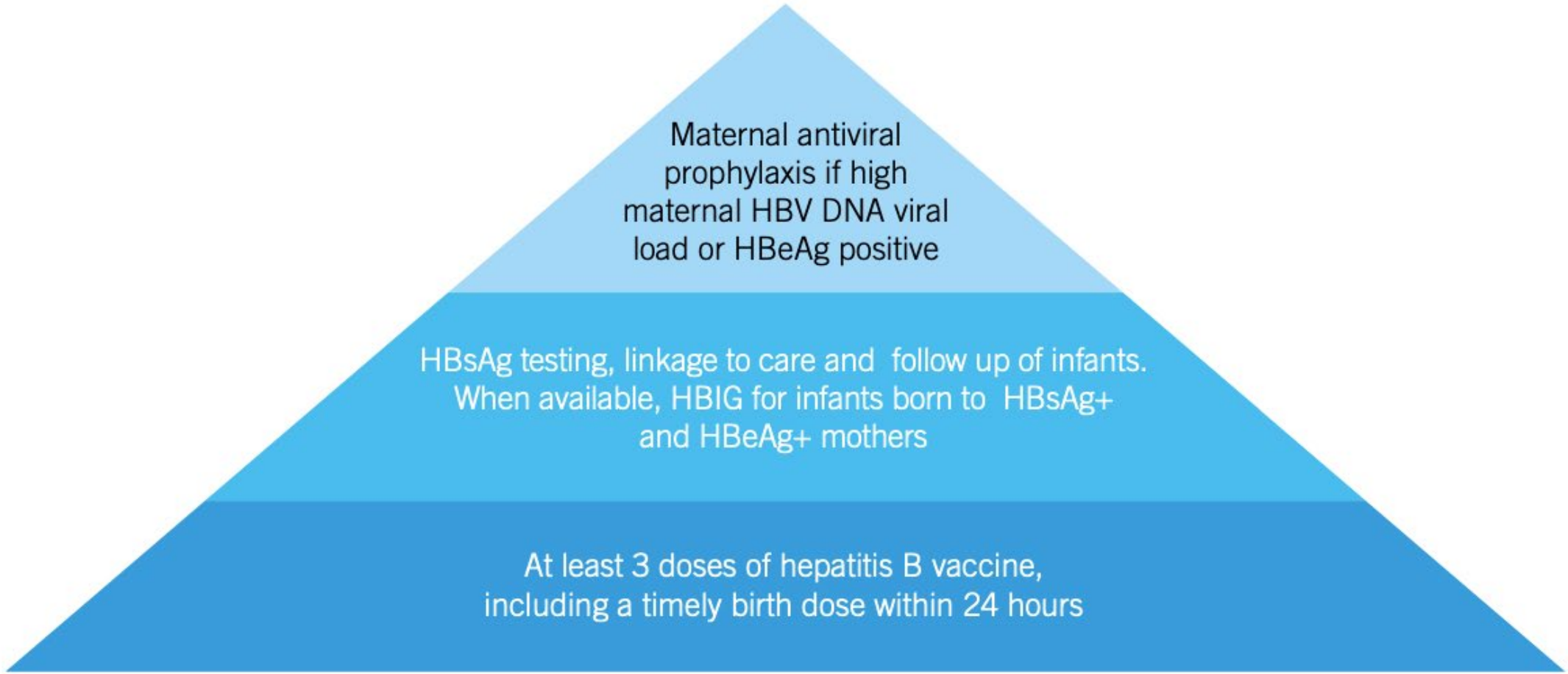
- Aims to raise the profile of hepatitis B as an urgent public health priority and helps put a human face on this serious disease by sharing stories of real people living with or affected by hepatitis B.
- The goals of the campaign are to increase awareness and advocacy; decrease stigma and discrimination; and promote testing, vaccination, linkage to care, and treatment to help save lives.

Since 2017


ALICE'S STORY
#justB GRATEFUL
HEPB.ORG/JUSTB/ALICE

MOTHER TO CHILD PREVENTION OF HEPATITIS B

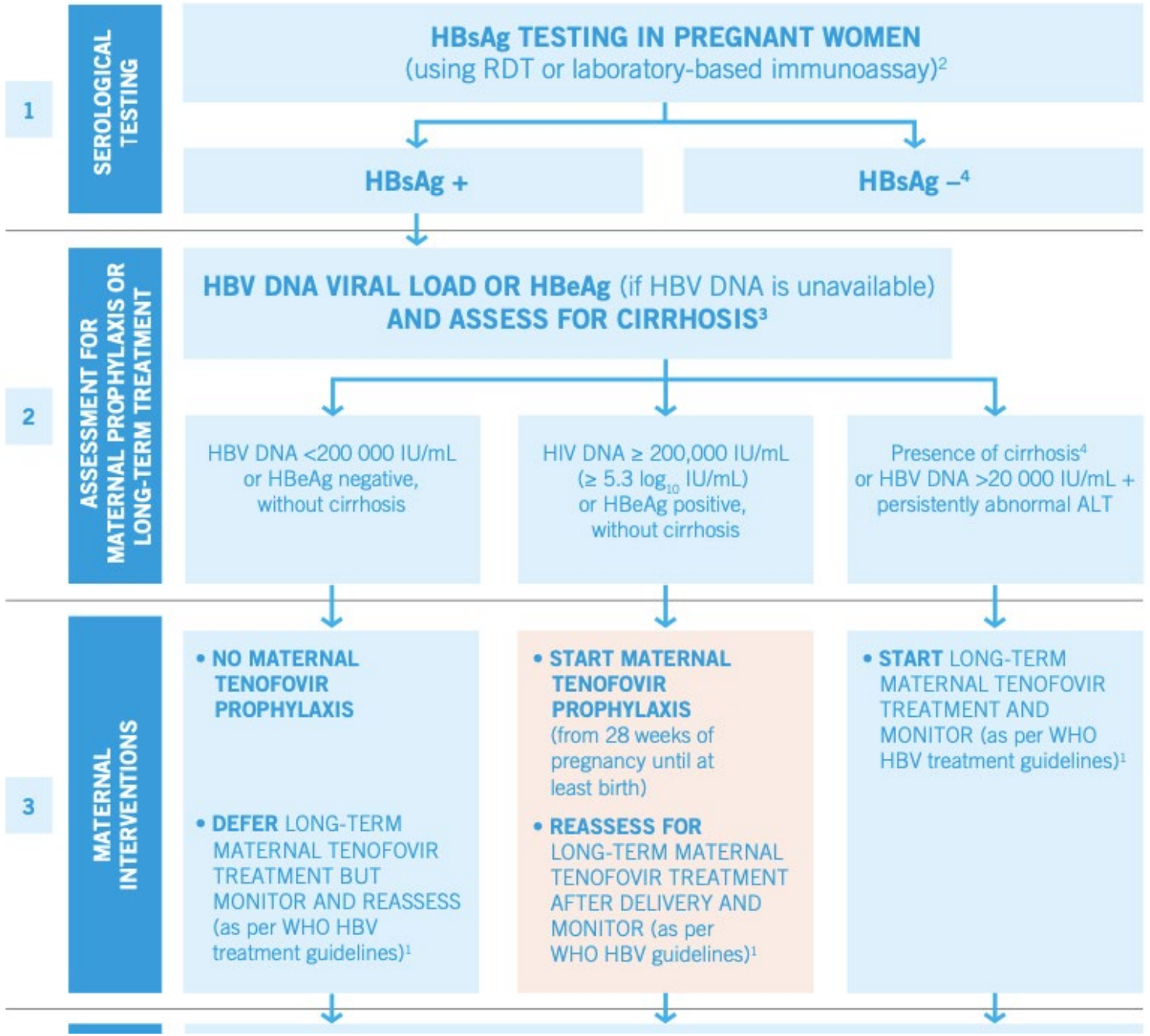
FIG. 1. Incremental approach to prevention of HBV infection at birth and in the first years of life



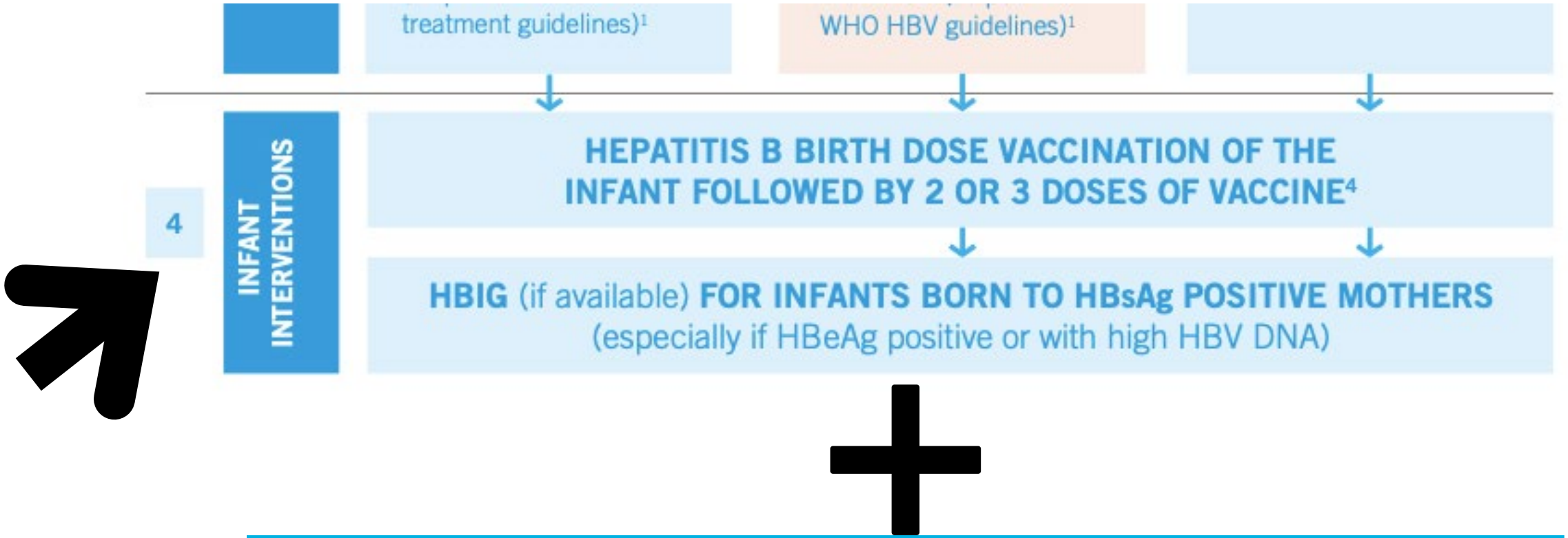
HBeAg: hepatitis B e antigen; HBIG: hepatitis B immune globulin; HBsAg: hepatitis B surface antigen

AN INCREMENTAL APPROACH TO PREVENTION OF HEPATITIS B INFECTION AT BIRTH IN THE FIRST YEAR OF LIFE (WHO, 2020).

WHO ALGORITHM ON MATERNAL AND INFANT INTERVENTIONS TO PREVENT MOTHER TO CHILD TRANSMISSION OF HEPATITIS B



Continuation of WHO Algorithm on Maternal and Infant Interventions to Prevent Mother to Child Transmission of Hepatitis B



Ensure Mother is linked to appropriate care after delivery

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HEPATITIS B FOUNDATION

- The Hepatitis B Foundation is a national nonprofit organization dedicated to finding a cure and improving the quality of life for those affected by hepatitis B worldwide.
- Est. in 1991
- Programs Include Hep B United, Hep B United Philadelphia, CHIPO, Hepatitis Delta Connect, and Liver Cancer Connect.
- Resources for individuals with hepatitis B and families (support groups, consultation line and advocacy
- www.hepb.org

SUCCESSFUL PROGRAMS

- Hep B Moms Program (started in NYC at CBW and now is at NEMS) – Medi-Cal program
- Perinatal HBV educations and care coordination
- Household contacts testing for HBV
- Linkage to care
- Timely HBV immunoprophylaxis, complete HBV vaccination, and post-vaccination serology testing for infants born to Hep B moms
- EHR for HBV
- In-language educational materials for patients
- https://www.health.ny.gov/diseases/communicable/hepatitis/hepatitis_b/perinatal/

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HEP B MOMS

- Case management including a scripted interview, hepatitis B education, and a letter listing referral sites for hepatitis B.
- Interview pregnant women after delivery to ensure vaccination series is completed and follow up testing to ensure immunity.
- During the post-natal interview, people were also asked if they were interested in follow up care.
- Post-natal interviews included barriers and facilitators to care, and addressing those barriers by scheduling follow up appointments, enrolling in insurance, connecting participants with multiple barriers to a hospital social worker for additional support,
- Navigators also offered services to family members including testing and vaccination.

HTTPS://LINK.SPRINGER.COM/EPDF/10.1007/S10903-021-01240-5?SHARING_TOKEN=LZQK_2NB0DBXXIIJQJ3AJVE4RWLQNCHNBYI7WBCMAY6Y-F_TOX5XGTGPM5K2HXJEVPUNAWKN2UP9KIZWME5JRHU5_YXZWIJFVTQ4V35PFRLFP3EFH7BWTSCZ7FR24XDP3F7VV20MR_S91TWL4I1SJYEOBQP6-ZYTPJV7GXN3ZPO%3D

PHILADELPHIA ENHANCED EDUCATION

- Provided provider training on the importance of hepatitis B perinatal prevention.
- Philadelphia Department of Public Health visited selected FQHCs where perinatal services were provided
- Provided continuing education for providers on testing for hepatitis B, and prevention strategies.

HEP B ECHO

- Ongoing provider training that is case-based.
- Focuses on topics related to hepatitis B including testing, treatment, management, liver cancer surveillance, perinatal prevention, vaccination guidelines, risk factors, and cultural competency.
- Free CME
- Every 4th Thursday at 12pm ET
- https://us02web.zoom.us/meeting/register/tZYsc-mrqjMjEtZaabsz-qr5iRYvVjKq75ec

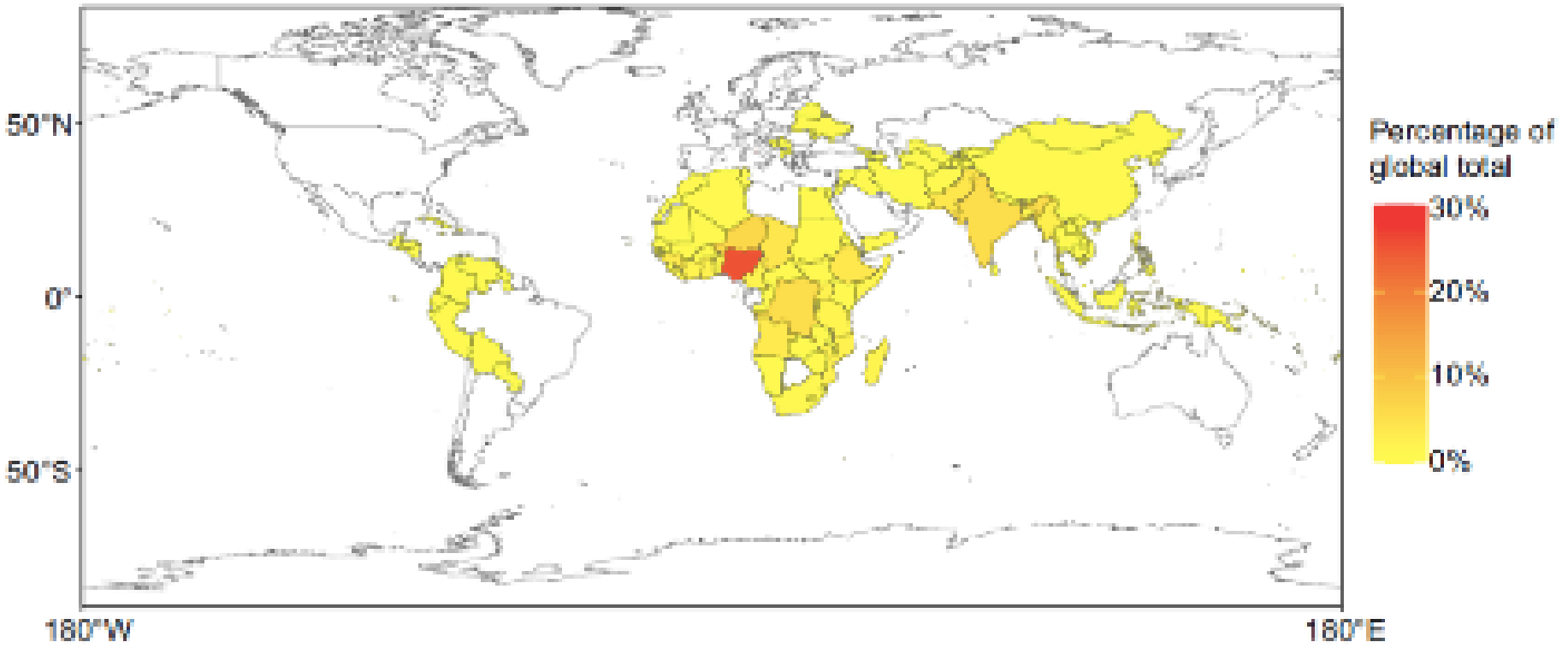
NIGERIA PROGRAM

- Assess if implementation improves total and timely HepB-BD coverage in Enugu and Adamawa states

Package components include

- Training maternal and child health (MCH) and Expanded Program on Immunization (EPI) staff on the importance of total and timely delivery of HepB-BD and maternal and neonatal tetanus elimination
- Training community volunteers to link pregnant women in the community to health facility (HF) for HF delivery, and timely HepB-BD
- Educating pregnant women during antenatal care (ANC) visits about the importance of HF delivery, and HepB-BD administration
- Engaging with community leaders and the general population to encourage HepB-BD vaccination
- Implementing regular supervisory visits to HFs

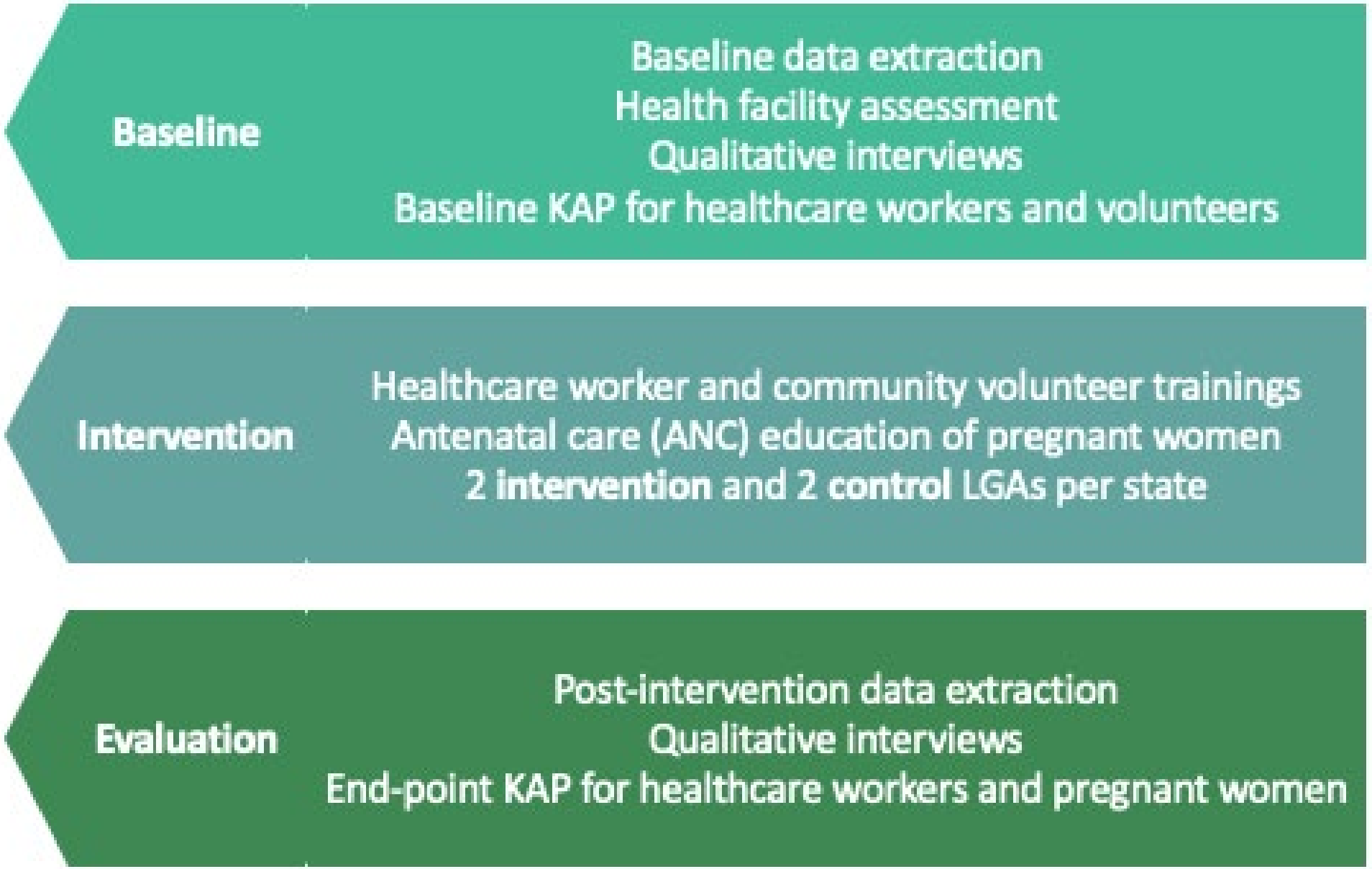
Percentage of global total HBV-related deaths averted in the 2020-2030 birth cohorts that occur in each country if timely HepB-BD was scaled-up to ≥90% by 2030 relative to status quo



Scaling up timely HepB-BD coverage to at least 90% in Nigeria would decrease HBV related deaths globally by at least 30%.

Source: de Villiers MJ, Nayagam S, Hallett T. The impact of the timely birth dose vaccine on the global elimination of hepatitis B. Nature Communications 2021; 12: 6323. https://doi.org/10.1038/s41467-021-26475-6

Project Design



Project Implementation To Date:

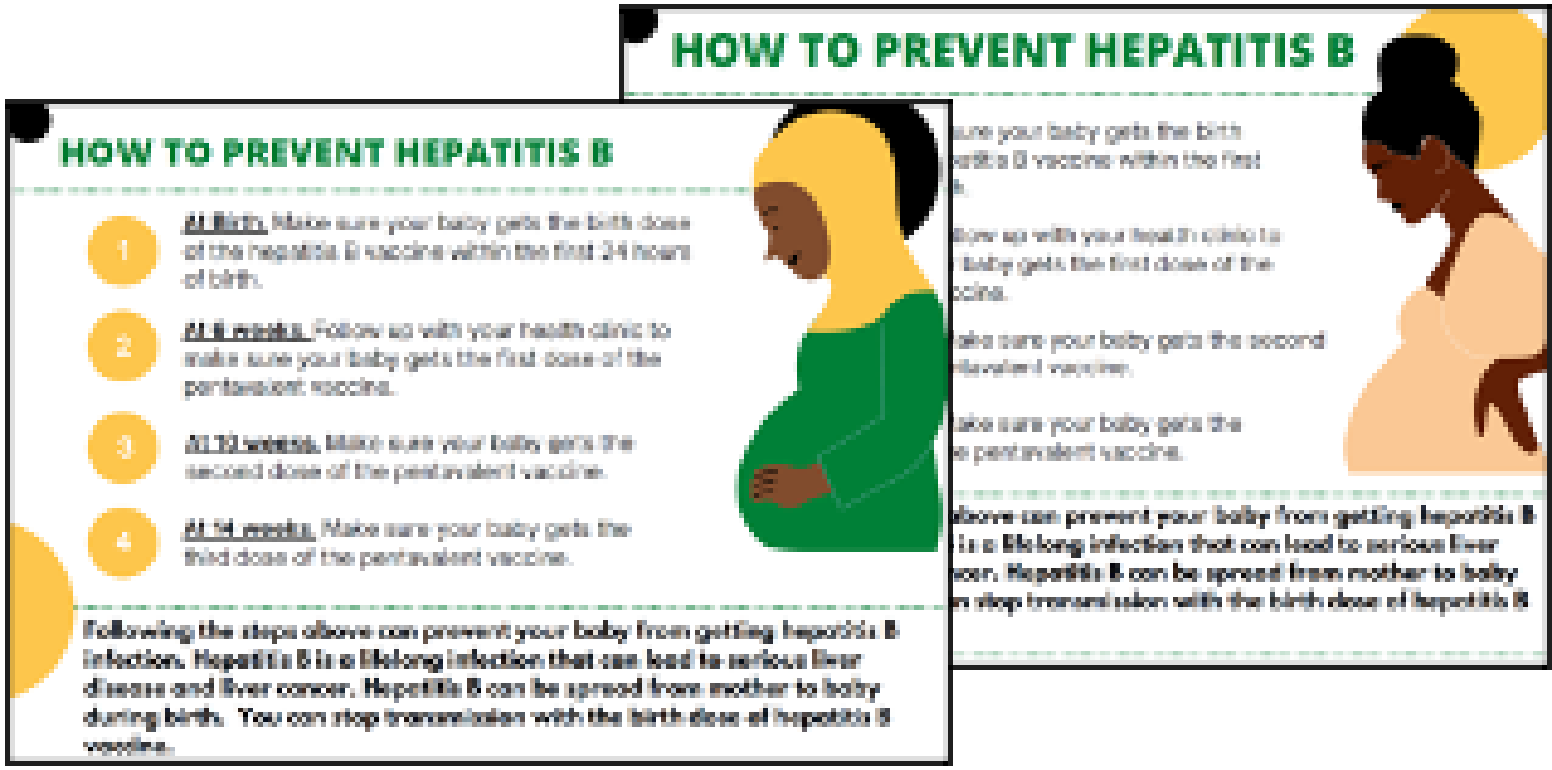
Baseline Assessment

- Baseline Data Extraction
- Health Facility Assessment
- Qualitative Interviews

Training (September 2021)

- Health Care Worker Training
- Community Volunteers
- Materials for Education During Prenatal Care

Routine Supervisory Visits (ongoing)



Successes

- Increased awareness of hepatitis B and the importance of timely birth dose among HCWs and pregnant women
- Maternity nurses administering HepB-BD as part of their newborn care package
- Community mobilizers linking mothers to HFs to receive the birth dose vaccine
- Some mothers who delivered at home still visited HF within 24 hours for HepB-BD
- Some HFs work with traditional birth attendants and community leaders to vaccinate infants delivered outside HF

Challenges

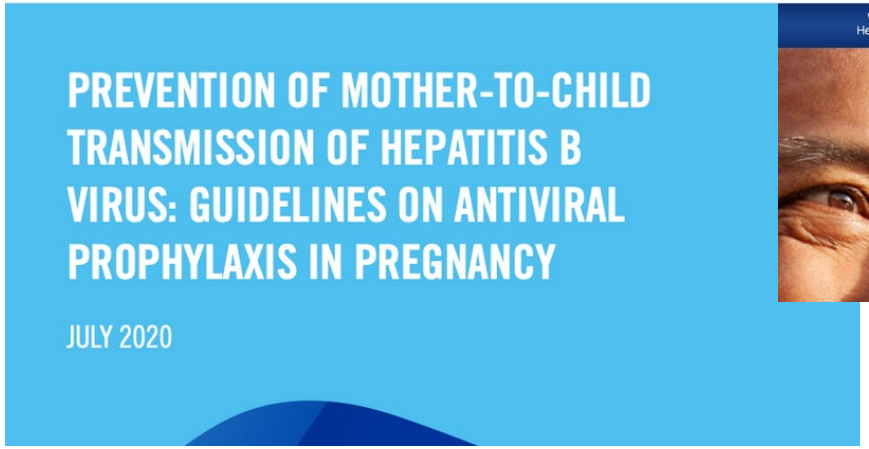
- Staff shortages in many of health facilities
- Inability to reach home and private facility births on time with HepB-BD
- Lack of budget for outreach immunization
- Inability to differentiate HepB-BD given within 24 hours of birth (timely) from late birth dose in the NHMIS monthly reporting form and DHIS-2

Acknowledgements

- National Primary Health Care Development Agency (NPHCDA)
- National Emergency Routine Immunization Coordination Centre (NERICC)
- State Primary Healthcare Development Agencies (Adamawa and Enugu)
- Nigeria CDC
- African Field Epidemiology Network (AFENET)
- CDC Nigeria
- Global Immunization Division (CDC Atlanta HQ)
- Hepatitis B Foundation

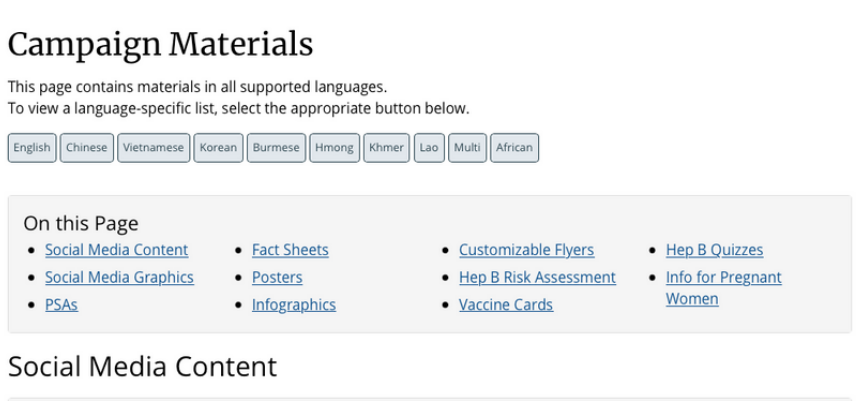
RESOURCES

World Health Organization



WORLD HEALTH ORGANIZATION RECOMMENDATIONS

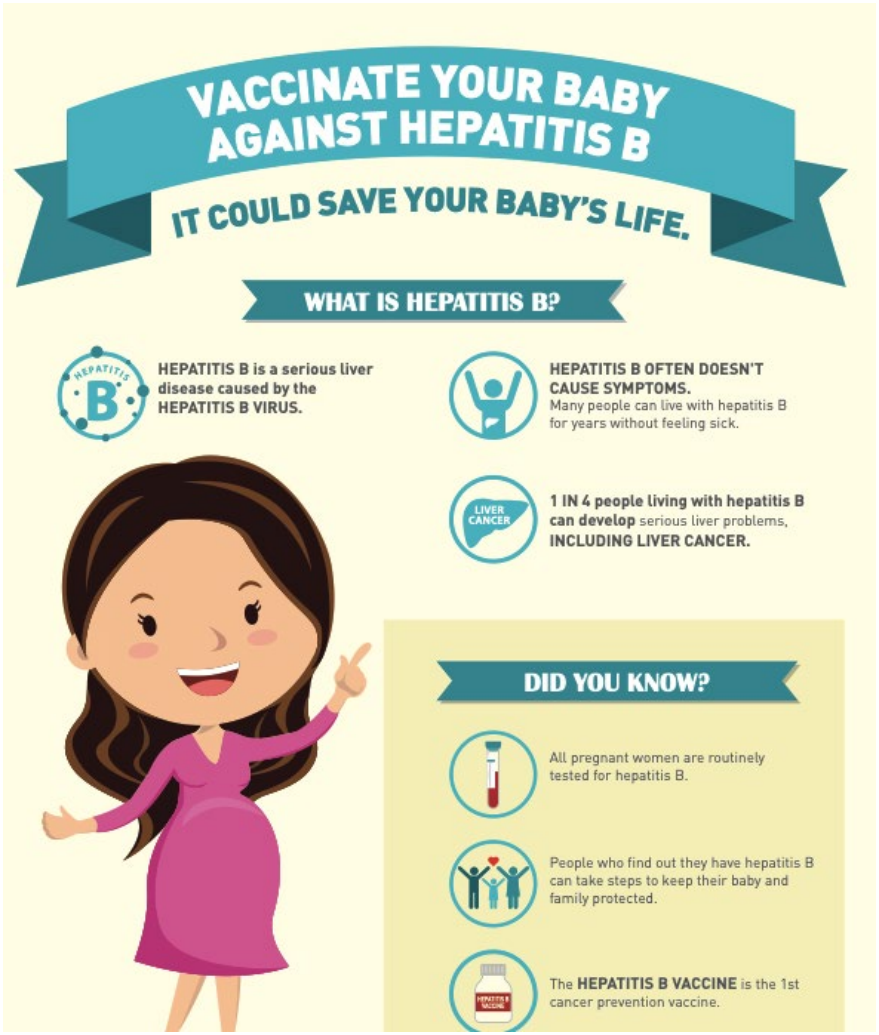
HEPATITIS B FOUNDATION FACT SHEETS AND RESOURCES



CDC KNOW HEPATITIS B CAMPAIGN

HTTPS://WWW.CDC.GOV/KNOWHEPATITISB/PDFS/INFOGRAPHIC-PERINATAL.PDF

RESOURCES



CDC KNOW HEPATITIS B CAMPAIGN

HTTPS://WWW.CDC.GOV/KNOWHEPATITISB/PDFS/INFOGRAPHIC-PERINATAL.PDF

RESOURCES

Hep B United™

hepbunited.org

HEP B UNITED IS A NATIONAL COALITION DEDICATED TO REDUCING THE HEALTH DISPARITIES ASSOCIATED WITH HEPATITIS B BY INCREASING AWARENESS, SCREENING, VACCINATION, AND LINKAGE TO CARE FOR HIGH-RISK COMMUNITIES ACROSS THE UNITED STATES.

GET IN TOUCH

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THANK YOU

Q&A

LUNCH

Texas Children's Hospital, Perinatal Hep B

F. Blaine Hollinger, M.D., FAASLD, AGAF, FIDSA

Neelima Agrawal, M.D., MPH

Texas Children's Hospital & Baylor College of Medicine

Prevention of Perinatal HBV Transmission: Evidence-Based Medicine

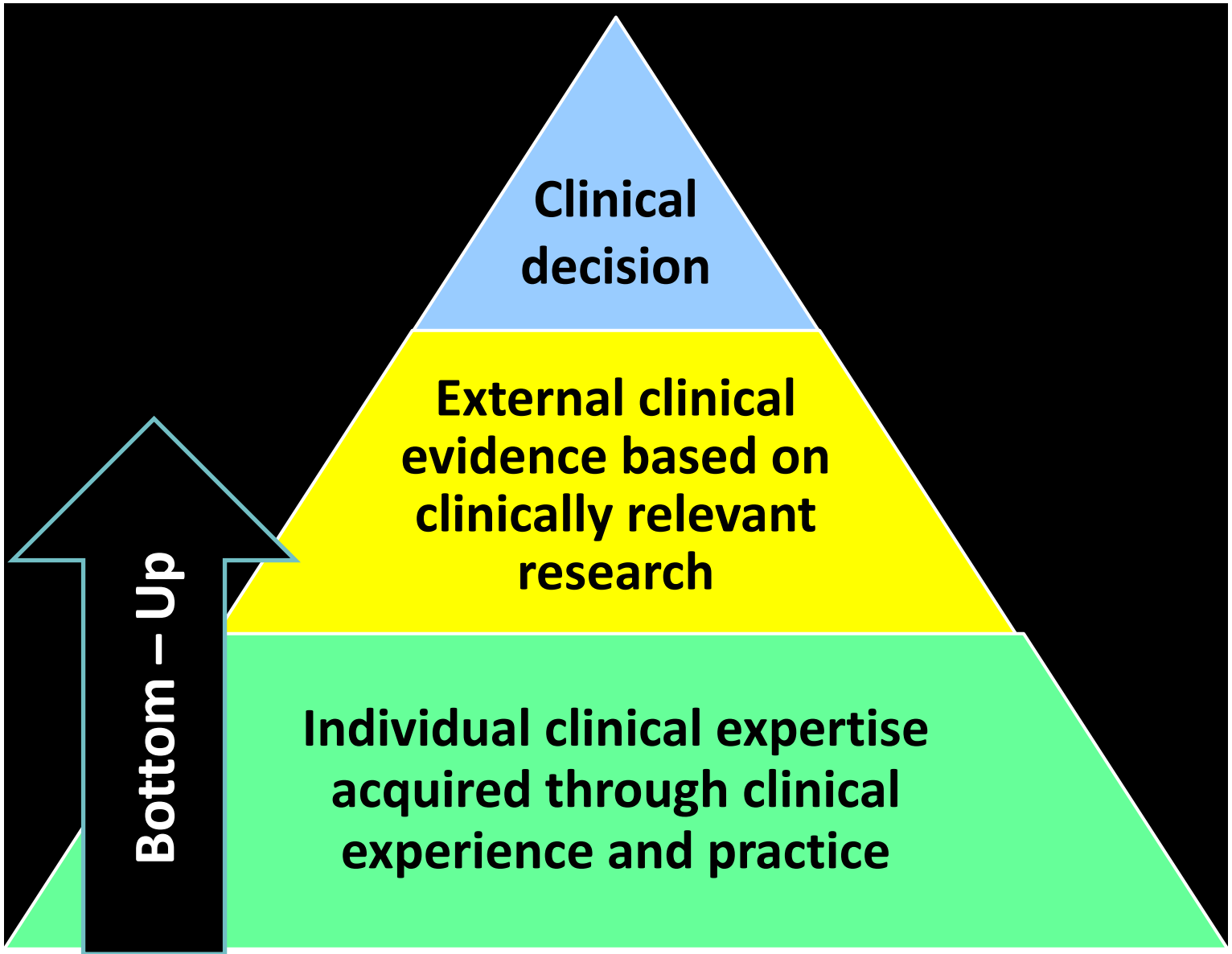
F. Blaine Hollinger, M.D., FAASLD, AGAF, FIDSA
Professor of Medicine, Molecular Virology & Epidemiology
Director, Eugene B. Casey Hepatitis Research Center
Baylor St. Luke's Liver Center

No Conflicts of Interest

Evidence-Based Medicine

- "….the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients."
- Not restricted to randomized trials; includes high quality meta-analyses, systematic reviews of randomized trials, homogeneous studies and best available external evidence

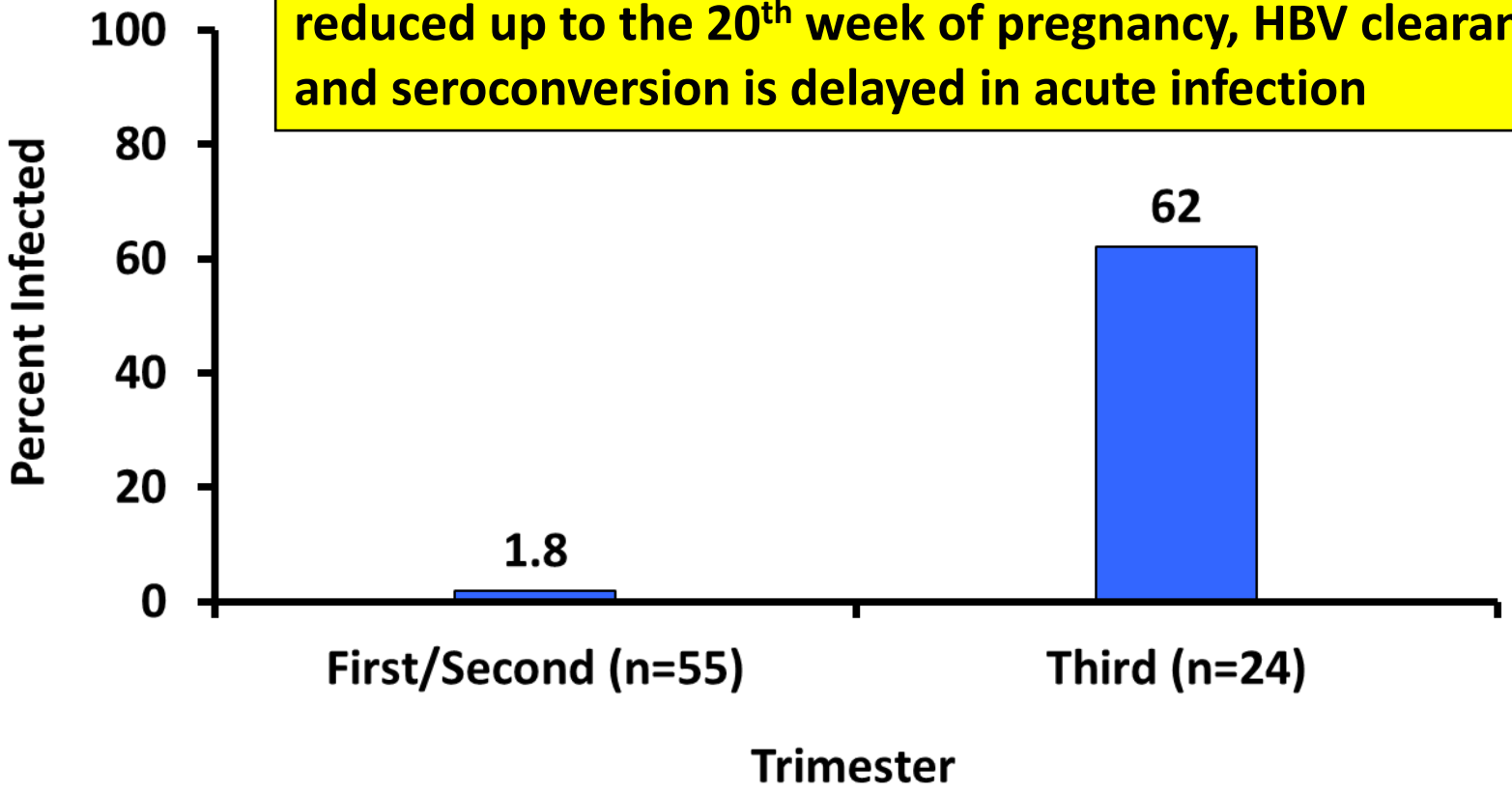
How do we use evidence-based medicine in making decisions about the care of individual patients?



Risk Before Neonatal HBV Immunoprophylaxis

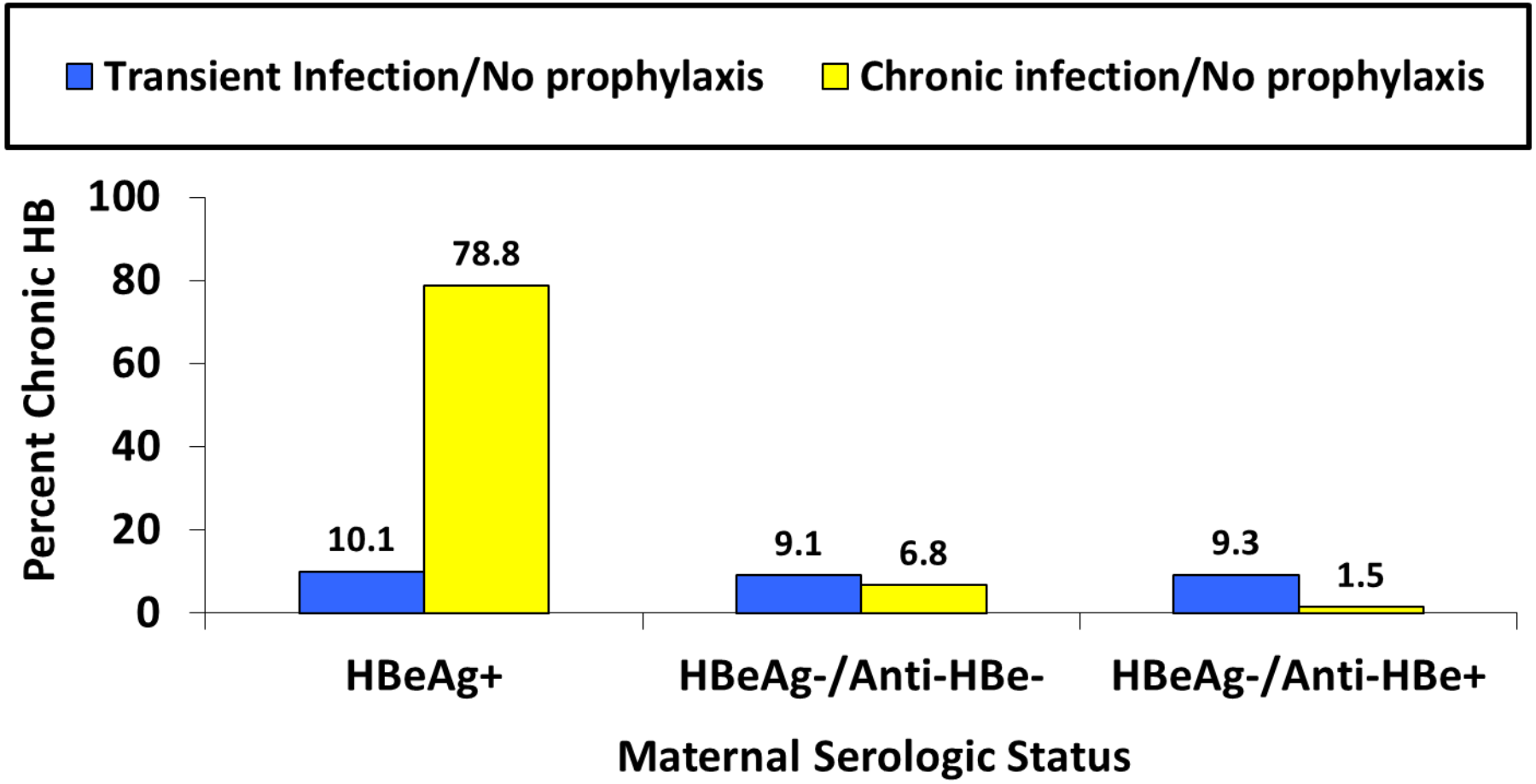
Immunopathogenesis of Acute HBV Infection in Pregnancy and Transmission to Infant

Because T-cell responses are weaker or markedly reduced up to the 20th week of pregnancy, HBV clearance and seroconversion is delayed in acute infection



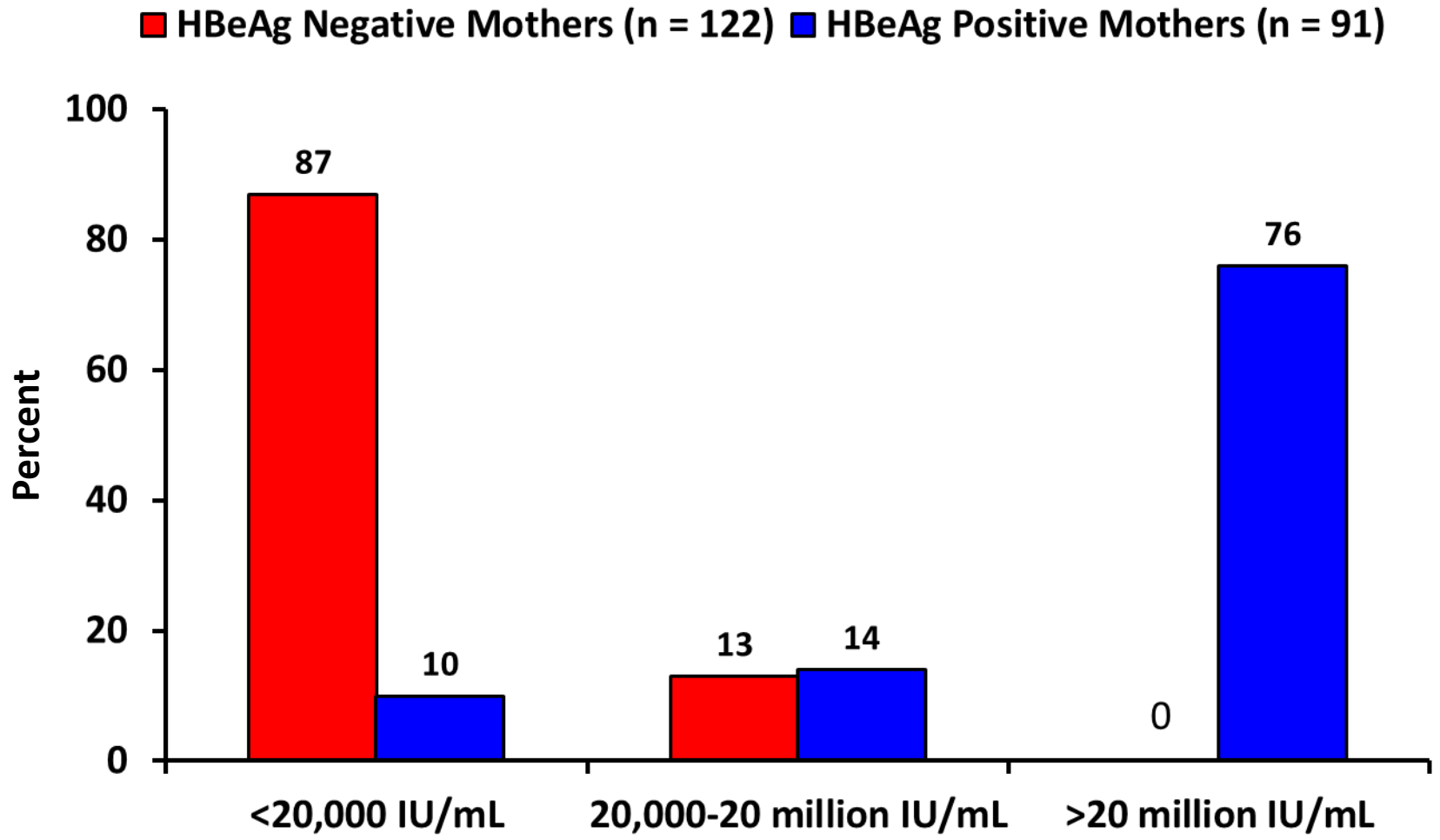
Tong MJ et al, 1989; Quint WG et al, 1994

Prevalence of Chronic Hepatitis B in Infants Based on Maternal HBV Serologic Status



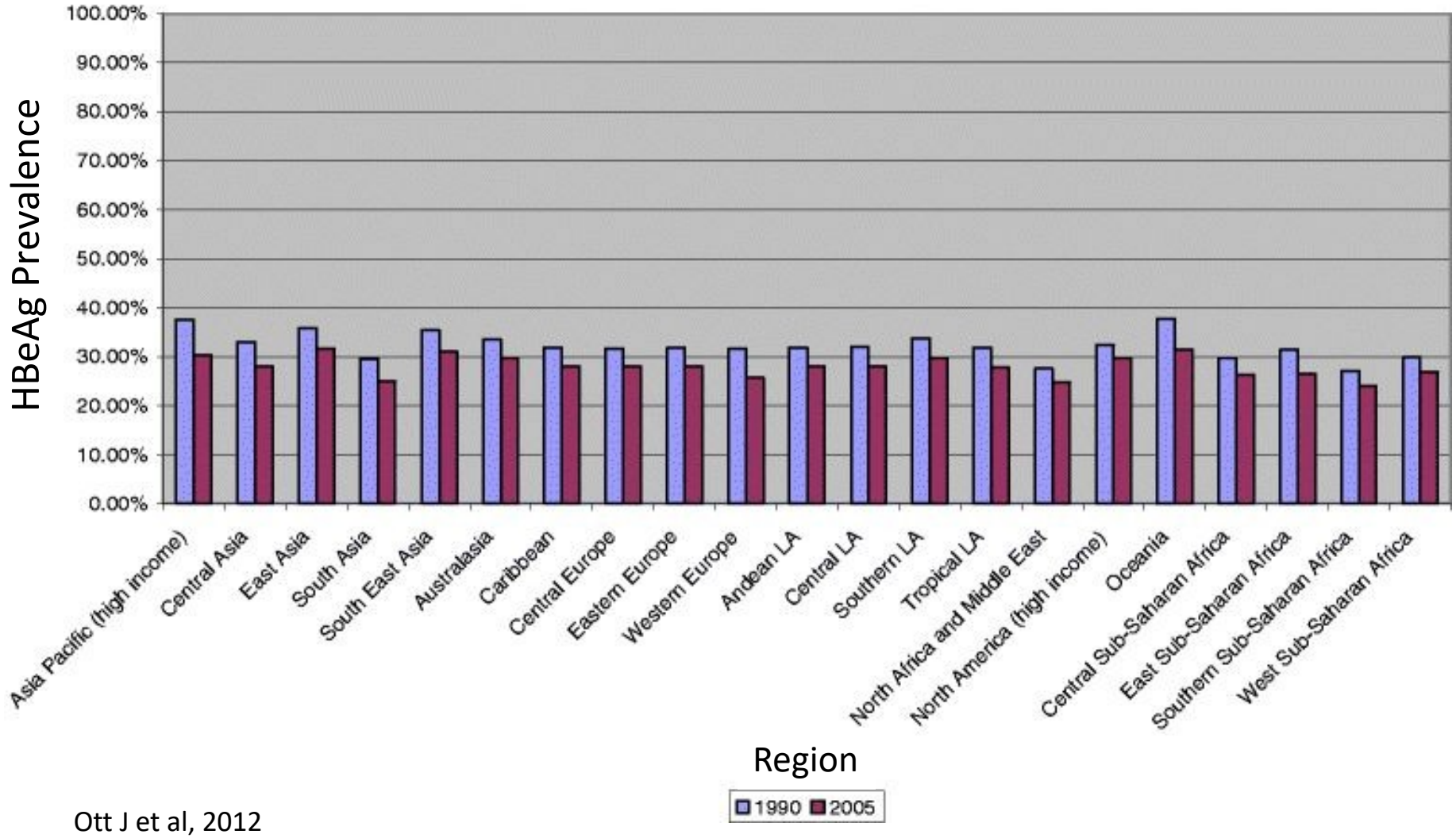
Isaacs D et al, 2011

HBeAg Status and Viral Load in 213 Women of Child-Bearing Age With Detectable HBV DNA



Modified from Wiseman E et al, 2009

HBeAg Prevalence Among HBV Infected Females in Their Reproductive Years (Aged 20-39)



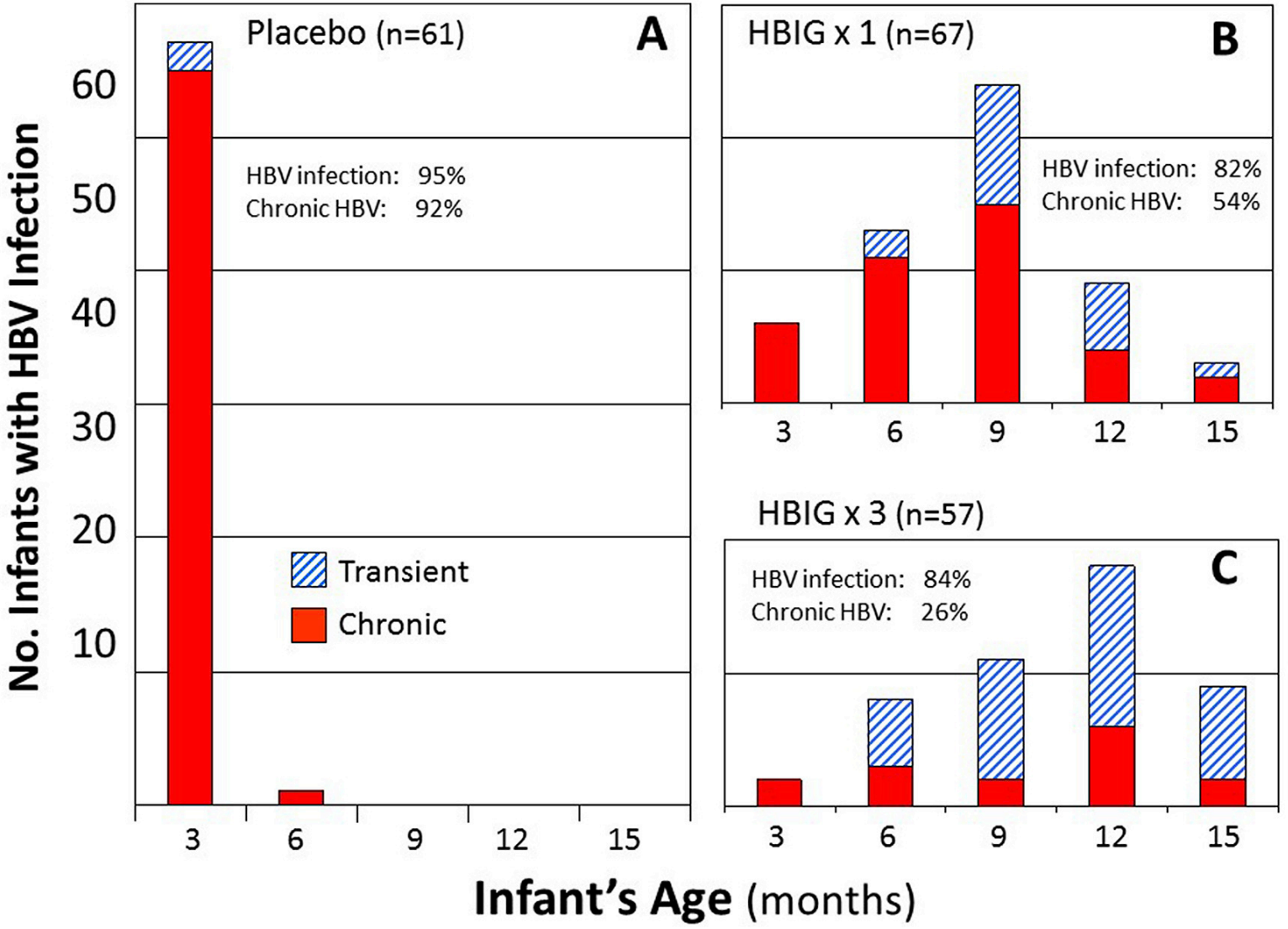
Ott J et al, 2012

Relationship Between Age and Outcome After Acute HBV Infection

Age at Infection	Symptomatic Infection	Chronic Infection
<1 year	<1%	70-90% (HBeAg positive mother) 1.5-7% (HBeAg negative mother)
1– 5 years	5–15%	25–50%
5–20 years	20–50%	6–10%
>20 years	60–75%	1–3%

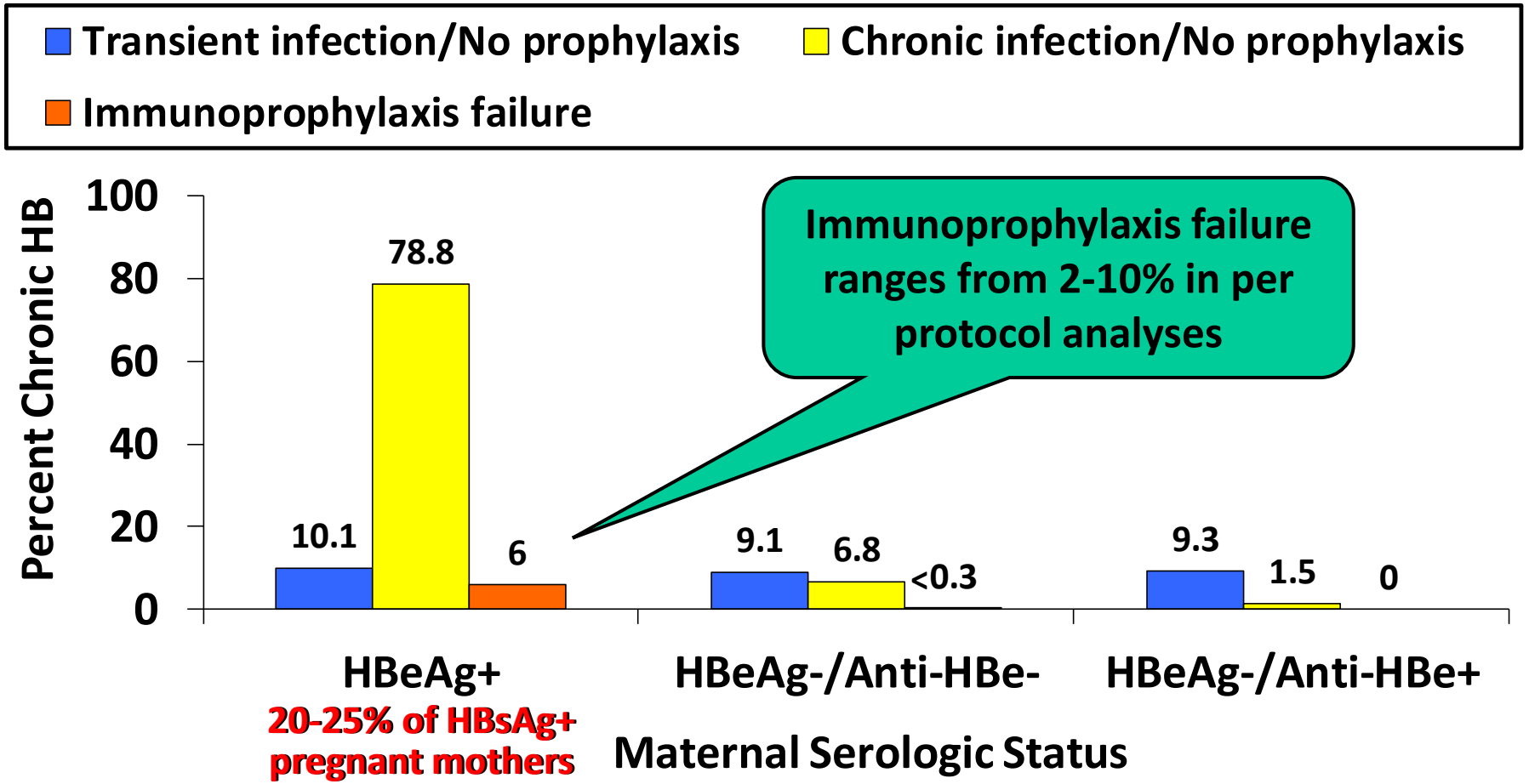
Immunoprophylaxis of HBV in Infants

Efficacy of HBIG in Preventing HBV Infection in Infants Born to HBeAg Positive Mothers



Stevens CE et al, 2017

Immunoprophylaxis Failure Rate Based on Maternal Serologic Status



Immunoprophylaxis failure seems to occur only in infants born to HBeAg positive mothers

Isaacs D et al, 2011

So, why isn’t protection absolute?

Infants are not immunologically competent

- Both innate and adaptive immune responses are functionally impaired in neonates often implicating APC and CD4 Th cells
  - Leads to increased susceptibility to pathogens and reduced responses to vaccines
  - Memory B cells are lacking in neonates (10% vs 40% in adults) leading to a slower capacity to develop immune responses

Infants are not immunologically competent

- Immune system is biased toward tolerance and Th2 responses leading to less immuno-pathology
  - ~15% of total CD4 T cells in the human fetus are Tregs that are responsible for the induction of tolerance. The proportion of Tregs among CD4 cells declines with age:
    - 4-10% in cord blood
    - 1-4% in young adults
    - 0.5% in healthy elderly adults

Genetic Factors Predict Nonresponsiveness to HBV Vaccine

- Several HLA class II loci presumably fail to recognize or bind weakly to the S-antigen
- Up to 7.5% of healthy HBsAg vaccine recipients are poor responders or nonresponders

Current HBV vaccines may have lower efficiency against some genotypes

- Almost all commercial hepatitis B vaccines are made from subgenotype A2 genomic material (subtype *adw2*)
- While protective against all genotypes of HBV, a slightly lower efficiency is observed against genotypes D and E and possibly other *y* subtypes, and this may influence prevention and durability of immunity

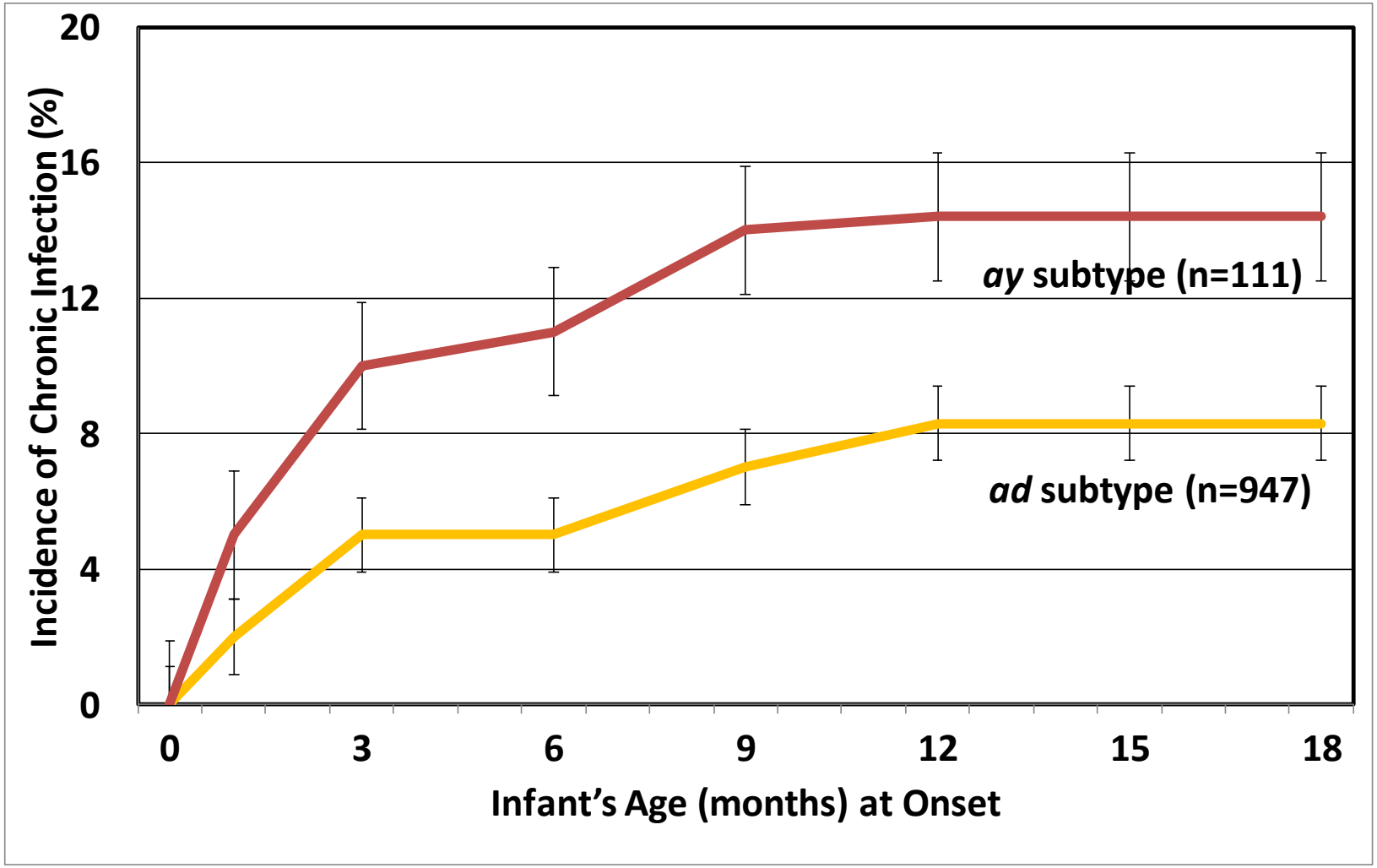
Norder H et al, 2010

Genotypes and Subtypes of HBV

Genotype	Subtypes	Geographic Location
A	*adw2, ayw1*	Europe, India, Africa, N. America
B	*adw2, ayw1*	Asia
C	*adw2, adr, ayr*	Asia
D	*ayw2, ayw3*	Worldwide
E	*ayw4*	W. Africa, Madagascar
F	*adw4, ayw4*	Central America, S. America, Alaska
G	*adw2*	S. America, Europe
H	*adw4*	Central America, USA

Norder et al, 2004

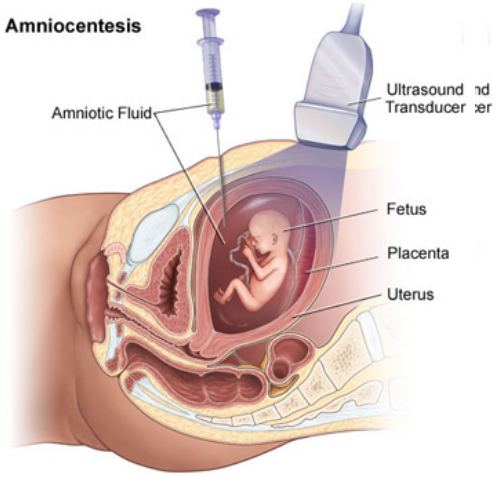
Maternal HBsAg Subtype and Perinatal Transmissions



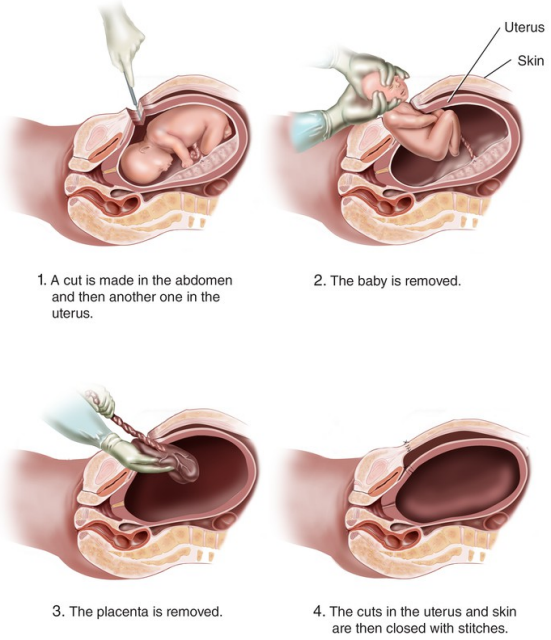
Stevens CE et al, 1987

HBV Perinatal and Postnatal Risk Factors: Amniocentesis, Cesarean Section and Breastfeeding

Amniocentesis



Cesarean Section

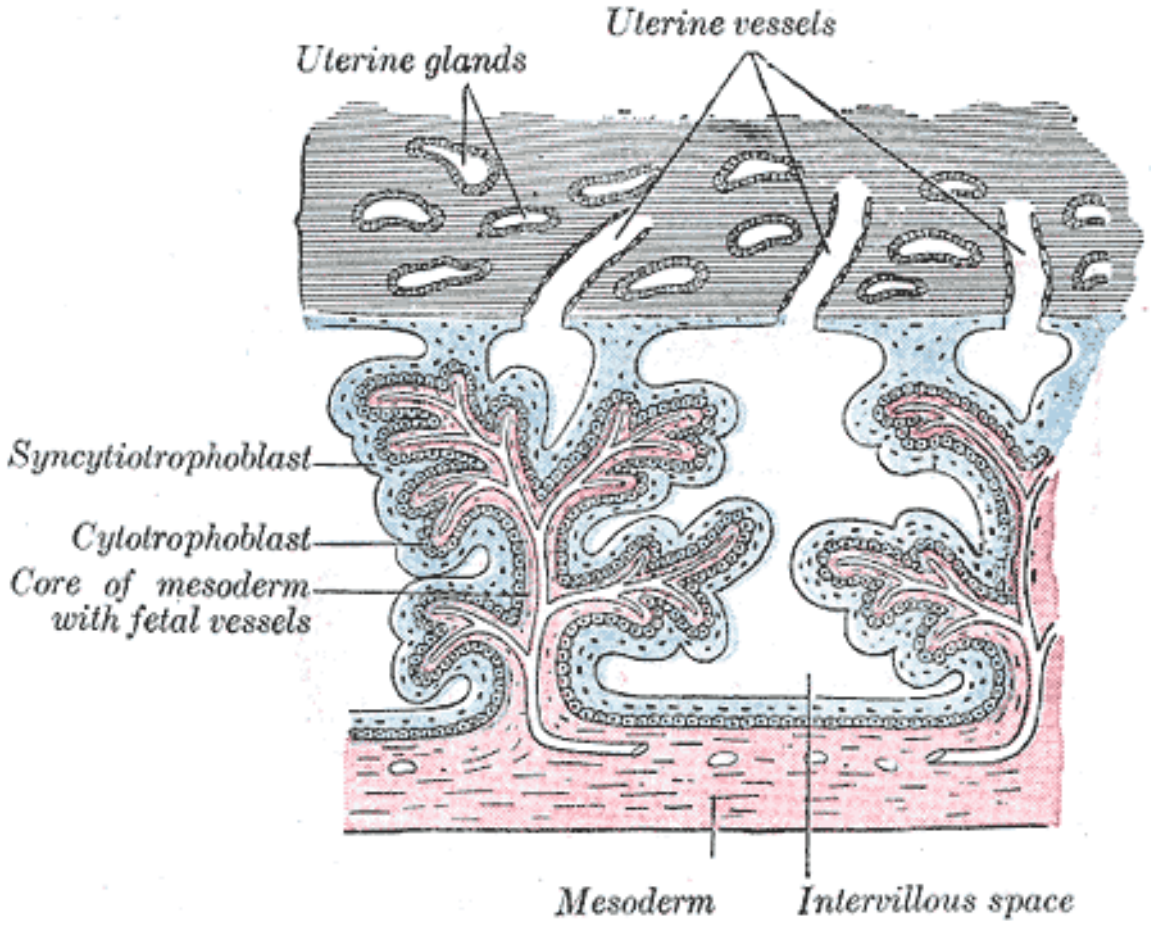


Breastfeeding

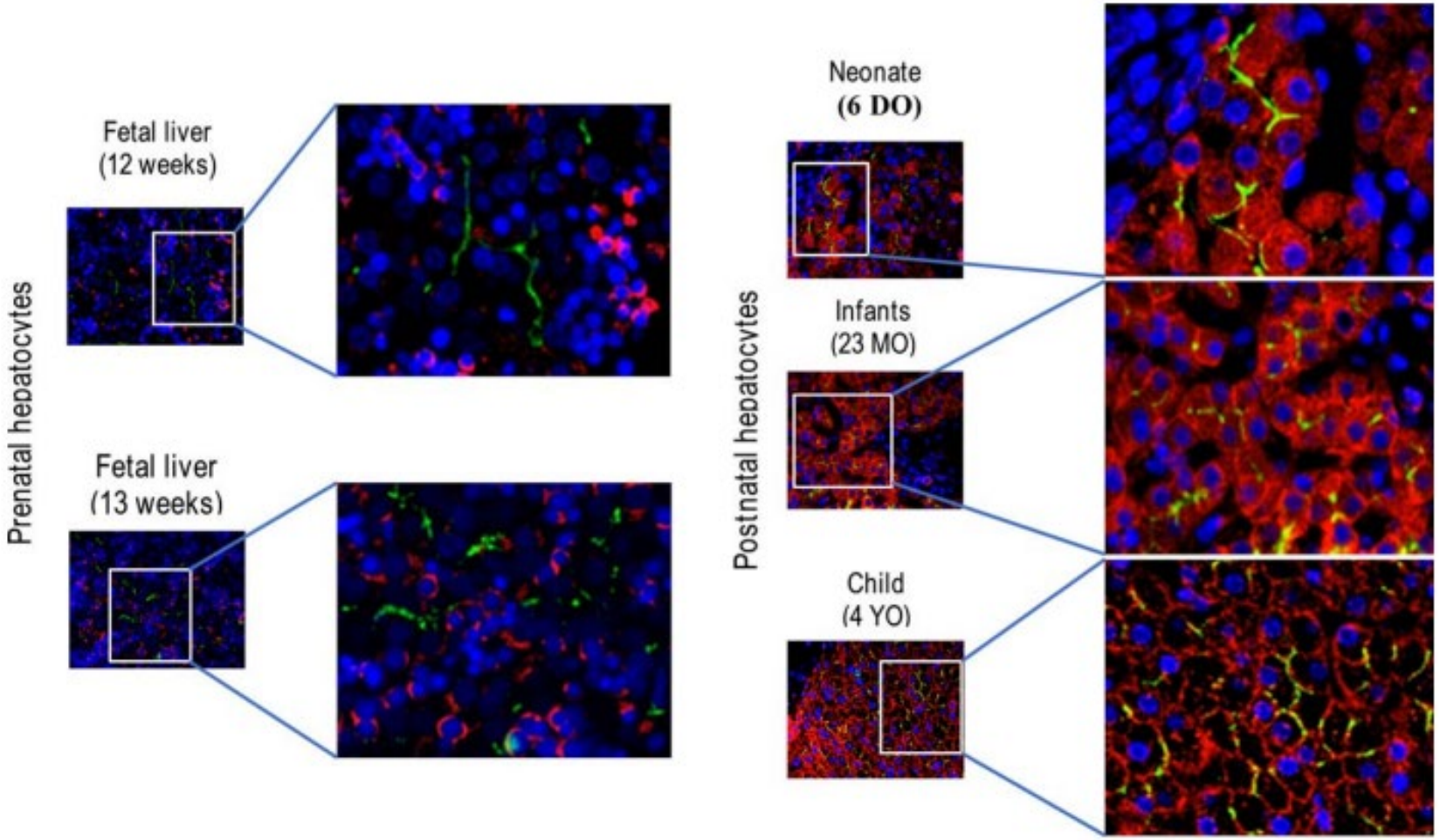
HBV Perinatal and Postnatal Risk Factors: Amniocentesis, Cesarean Section and Breastfeeding

- Amniocentesis is an independent factor for the intrauterine transmission of HBV in HBeAg positive pregnant women with HBV DNA ≥7.0 $\log_{10}$ IU/mL (Han Z et al, 2019; Yi W et al, 2014).
- Transplacental amniocentesis should be avoided.

Histology of Human Placenta



NTCP Localization in Human Hepatocytes



Sargiacomo C et al, 2018

HBV Perinatal and Postnatal Risk Factors: Amniocentesis, Cesarean Section and Breastfeeding

- The risk of HBV transmission is significantly lower in infants delivered by elective Cesarean section (1.4%) than by vaginal delivery (3.4%) or urgent Cesarean section (4.2%) when combined immunoprophylaxis is administered (Pan CQ et al, 2013)
- Breastfeeding after proper immunoprophylaxis does not contribute to mother-to-child transmission of HBV (Shi Z et al, 2011; OR 0.86, 0.51-1.45)

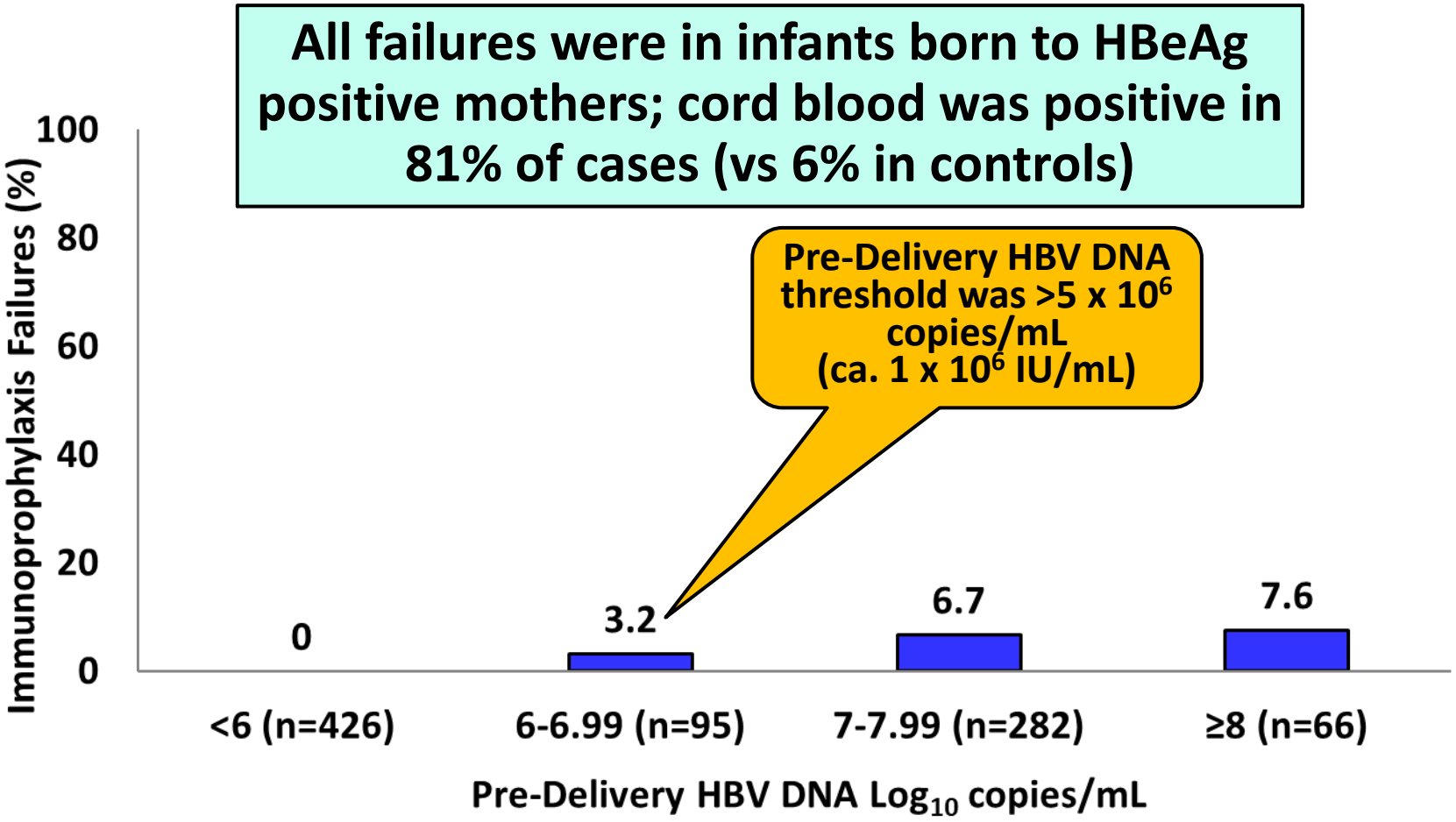
Solving the Puzzle of Immunoprophylaxis Failure

In a nutshell, credible evidence-based data is seriously lacking to validate the efficacy of antiviral therapy administered to a pregnant woman at a specific trimester or predelivery threshold level to prevent vertical transmission, and studies are often methodologically flawed and contain numerous errors

Flaws in published articles are compromising the preparation of guidelines

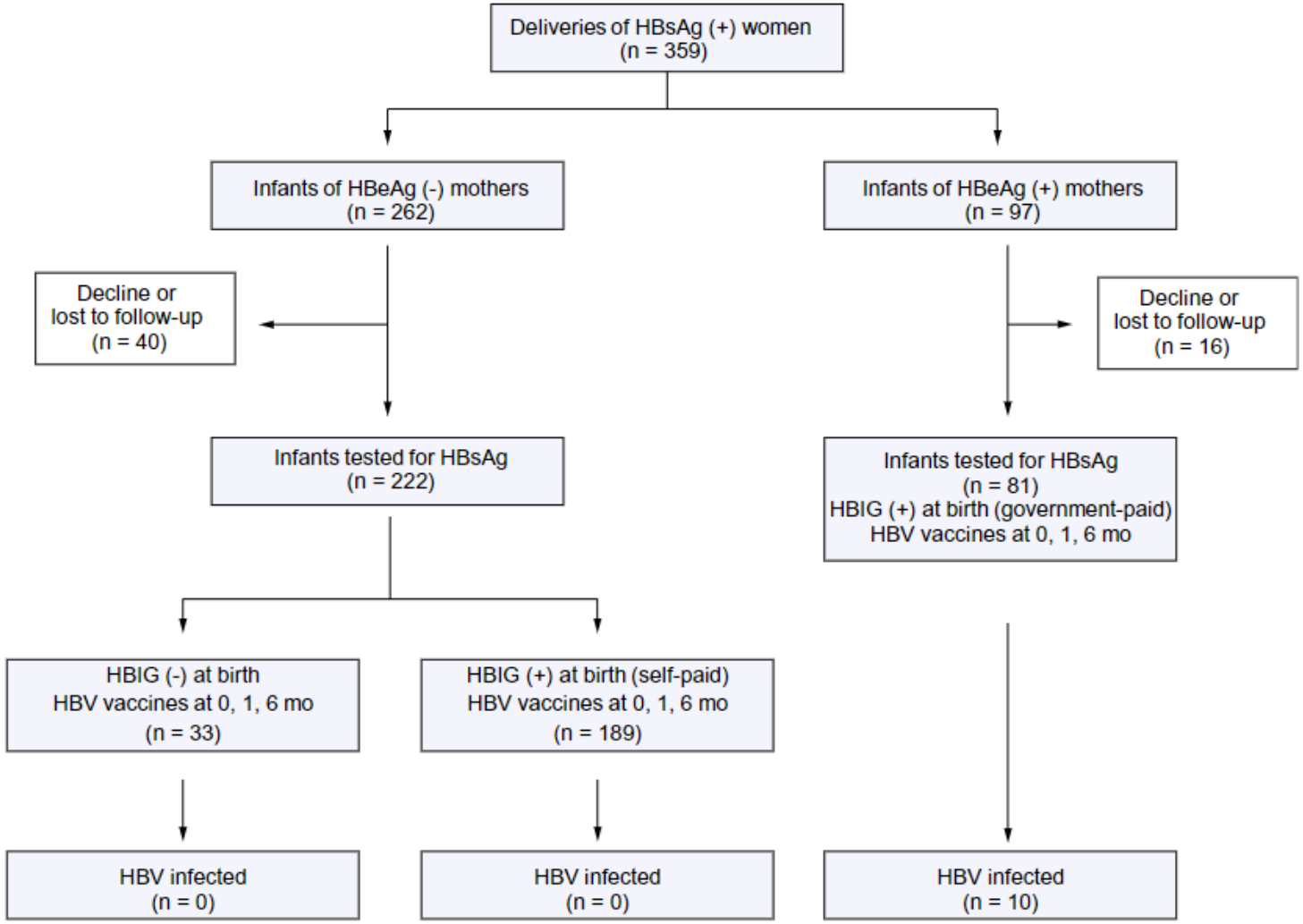
1. High drop-out rates/inadequate follow-up/small numbers
2. Methodological and clinical heterogeneity (diversity) is common
3. Suboptimal, confusing or incorrectly stated details of immunoprophylaxis regimens exist
4. Historical controls may be used for comparisons
5. Lack of randomized, double-blind, controlled clinical trials (“opt-in, opt-out” selection process)
6. Misinformation and errors occur in printed publications

Immunoprophylaxis Failures Among 869 Infants Born to HBsAg Positive Mothers



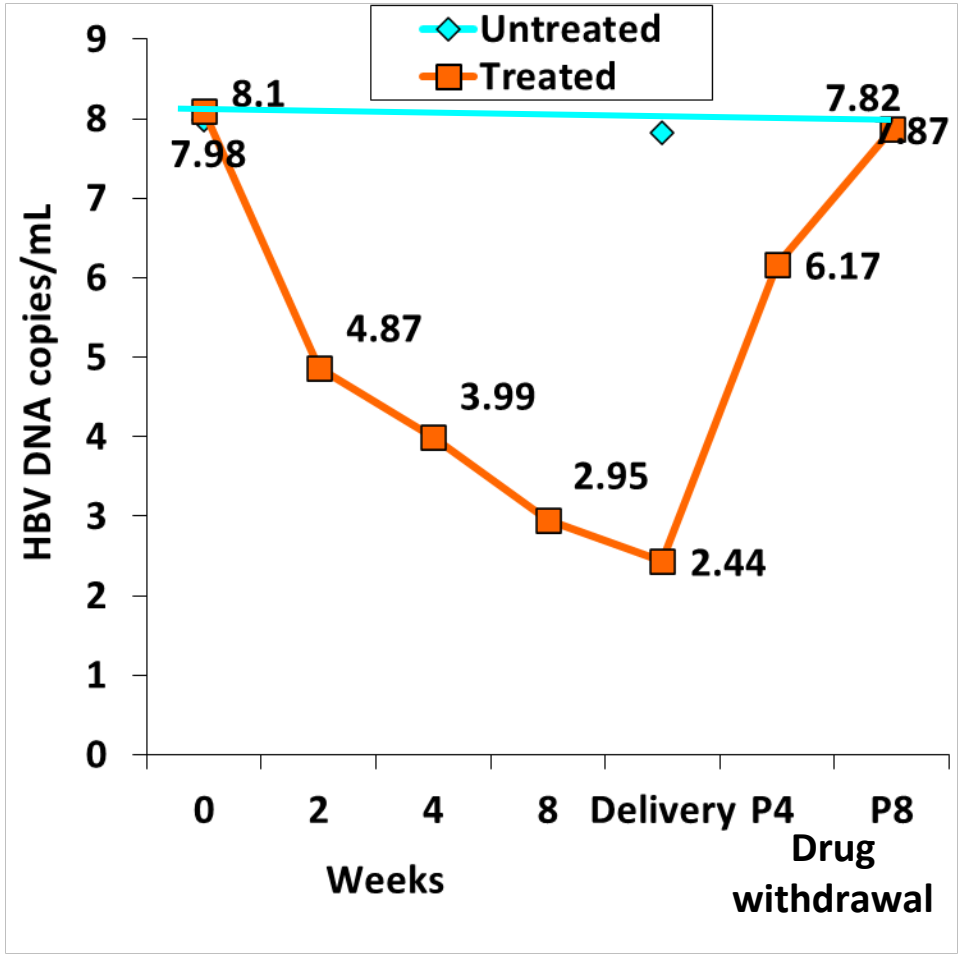
HBIG and vaccine within 12 hr of birth + 2 additional doses of vaccine within 6 months
3.1% immunoprophylaxis failures (Zou H et al, 2012)

Mother-to-Infant Transmission of HBV Infection in Taiwan Without Antivirals

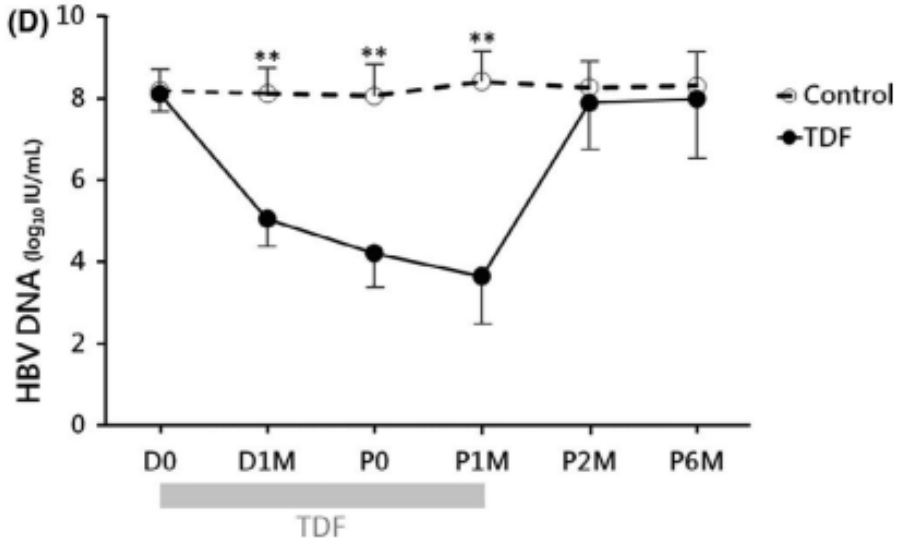


Wen W-H et al, 2013

HBV Pharmacokinetics in HBV Infected Mothers Treated and Not Treated With Telbivudine or TDF



Han G-R et al, 2011; telbivudine, week 20-32 of gestation



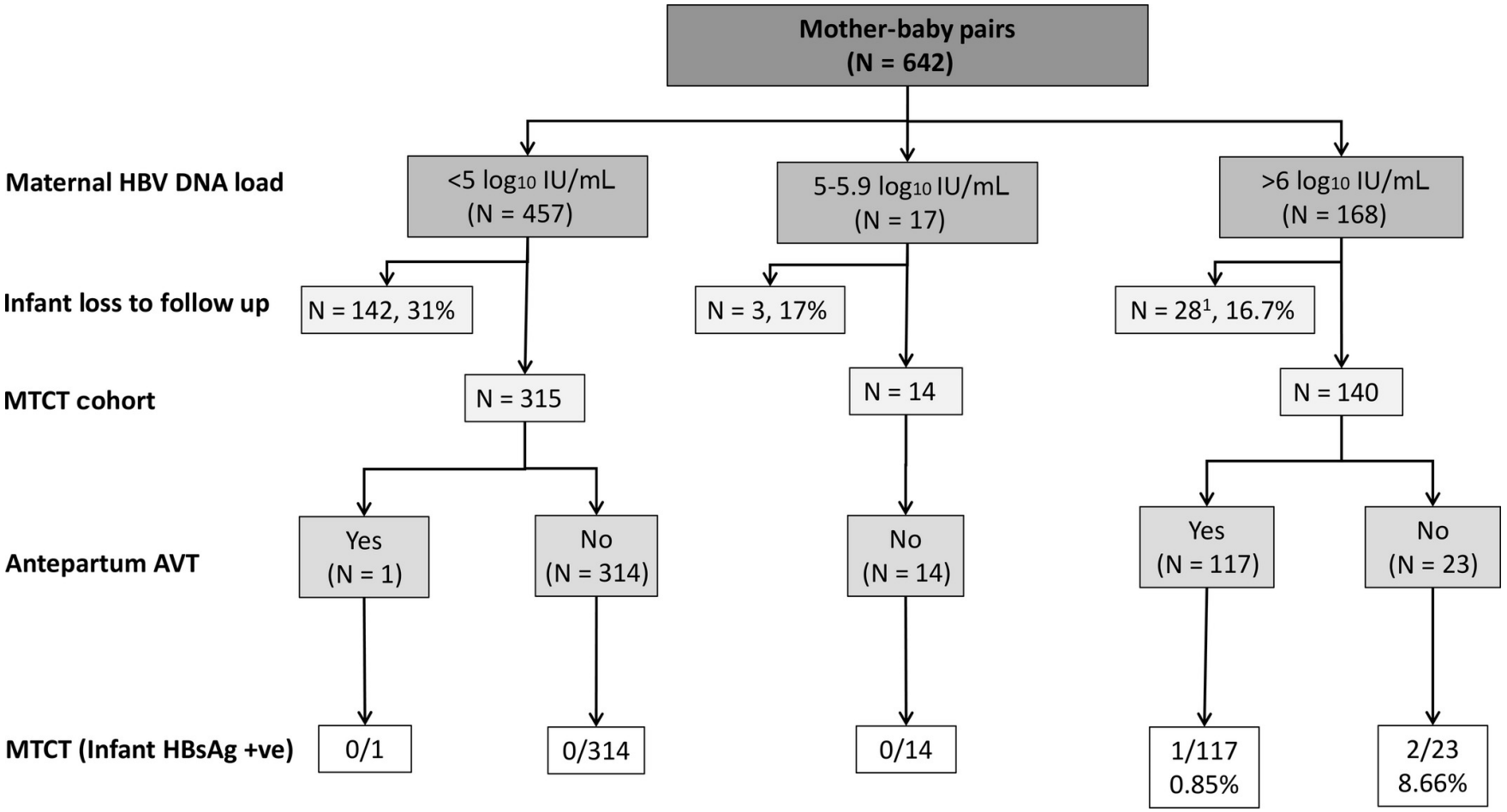
Chang H-L et al, 2022

Postpartum Flares: Etiology

- HBeAg seroclearance
- Immune reconstitution following delivery reverses those changes that occur during pregnancy designed to prevent rejection
- Sudden decrease in cortisol levels

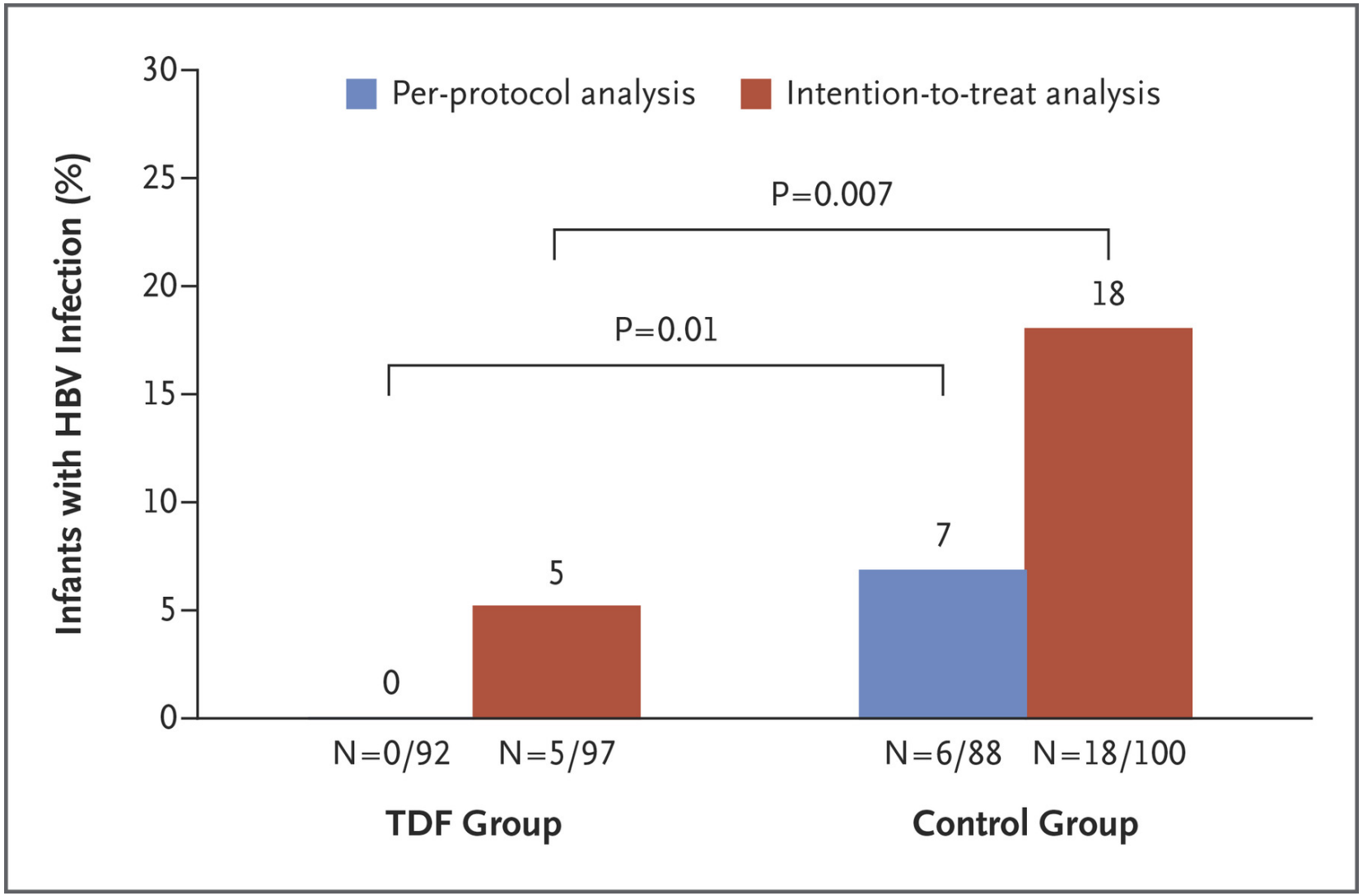
Most flares are self-limited and do not require therapy, but some can be severe leading to liver failure.

Mother-to-Child Transmission According to Maternal Viral Load



Thilakanathan C et al, 2018

Rate of HBV Infection Among Infants



Pan CQ et al, 2016

Primary, Secondary and Exploratory End Points

Table 2. Primary, Secondary, and Exploratory End Points.*

End Point	TDF Group			Placebo Group			P Value†
	No. of Participants	No. of Events	Value	No. of Participants	No. of Events	Value	
Efficacy end points in infants at 6 mo							
HBV infection — % (95% CI)							
Primary analysis	147	0	0 (0–2)	147	3	2 (0–6)	0.12
Analysis with twins considered separately	149	0	0 (0–2)	147	3	2 (0–6)	0.12
Analysis with last available infection status imputed	160	0	0 (0–2)	159	3	2 (0–5)	0.12
Analysis with missing data imputed as infected	167	20	12 (8–18)	163	19	12 (7–18)	0.60
Anti-HBV antibodies ≥10 IU/liter — % (95% CI)	147	147	100 (98–100)	147	145	99 (95–100)	0.25
Safety end points at 6 mo							
ALT >300 IU/liter in women after trial-regimen discontinuation — % (95% CI)	154	9	6 (3–11)	157	5	3 (1–7)	0.29
Adverse event of grade 3 or 4 or serious adverse event — % (95% CI)‡							
In women	168	41	24 (18–32)	163	44	27 (20–34)	0.62
In infants	161	43	27 (20–34)	160	38	24 (17–31)	0.61
WHO z scores among infants at 6 mo	148	—		146	—		
Weight for age			−0.4±1.1			−0.2±1.1	0.09
Length for age			−0.2±1.2			−0.2±1.2	0.67
Head circumference for age			−0.6±1.1			−0.6±0.9	0.76
Exploratory end point							
HBV DNA level among women at delivery — $\log_{10}$ IU/ml	161	—	4.0±1.6	159	—	7.3±1.7	<0.001

* Plus–minus values are means ±SD. ALT denotes alanine aminotransferase, and WHO World Health Organization.
† P values were calculated by Fisher's exact test for binary outcomes and by Student's t-test for continuous outcomes. They were one-sided for efficacy analyses and two-sided for safety analyses and for the exploratory end point of the HBV DNA level at delivery.
‡ Adverse events of grade 3 or 4 were defined as events that were severe and potentially life-threatening and were graded according to the Division of AIDS tables.[21]

Jourdain G et al, 2018

What can we conclude from a careful review of the literature?

1. Perinatal transmission of HBV can even occur when immunoprophylaxis appears to be optimal
2. Risks are positively correlated with maternal HBeAg status and high viral load with failure rates that range from 2-10% in this at-risk group
3. Initiation of HBV therapy with telbivudine or tenofovir have been shown to reduce or eliminate this risk

Provocative Questions That Remain Unanswered

- Why don't all the infants in this risk category become infected? Why is it limited to only a relatively small proportion?
- Would this proportion be even smaller (or eliminated) if HBIg were given in the delivery room and more doses were given, or the vaccine was composed of a more potent or genetically diverse immunogen, or more doses were given?
- Could these cases be the result of HBV infection of embryos or oocytes at or before conception?
- Could there be a mismatch between the vaccine and the infecting serotype?

International Association Guidelines

Designing Guideline Documents

- Represent current thinking based on clinically relevant research that is arrived at by consensus
- Do not establish legally enforceable requirements; thus, are not mandates
- Intended to be flexible
- Must integrate individual clinical expertise and experience with external clinical evidence to formulate a clinical decision

International Association Guidelines

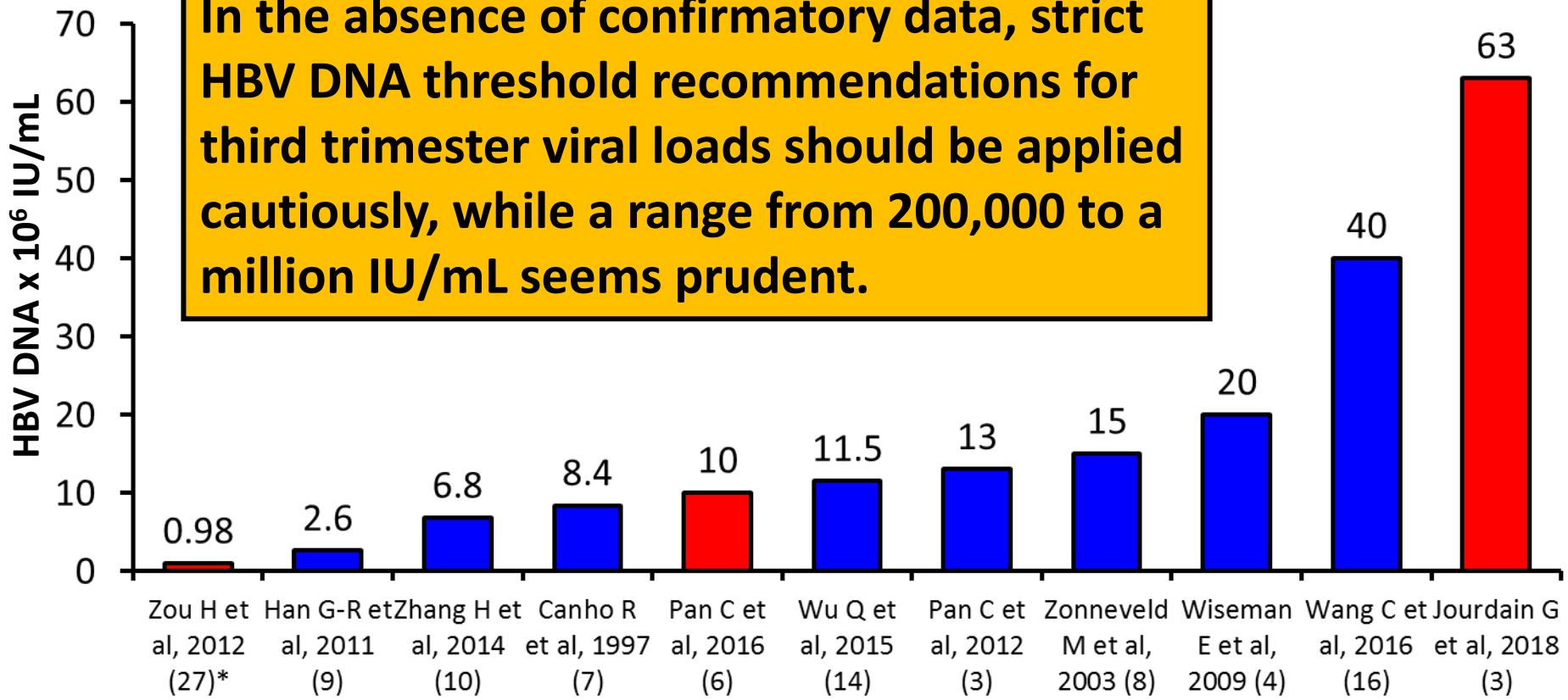
- **AASLD – 2016**
  - **The AASLD suggests antiviral therapy to reduce the risk of perinatal transmission of hepatitis B in HBsAg-positive pregnant women with an HBV DNA level >200,000 IU/mL.**

International Association Guidelines

- **EASL – 2017**
  - **In all pregnant women with high HBV DNA levels (>200,000 IU/mL), antiviral prophylaxis with TDF should start at week 24-28 of gestation**
- **APASL – 2022**
  - **…short term maternal NAs starting from 28-32 weeks of gestation is recommended using either TDF or telbivudine for those mothers with HBV DNA >200,000 IU/mL**

Published HBV DNA Threshold Levels

In the absence of confirmatory data, strict HBV DNA threshold recommendations for third trimester viral loads should be applied cautiously, while a range from 200,000 to a million IU/mL seems prudent.



*** Number in parenthesis is immunoprophylaxis failures reported**

Some Take-Home Messages

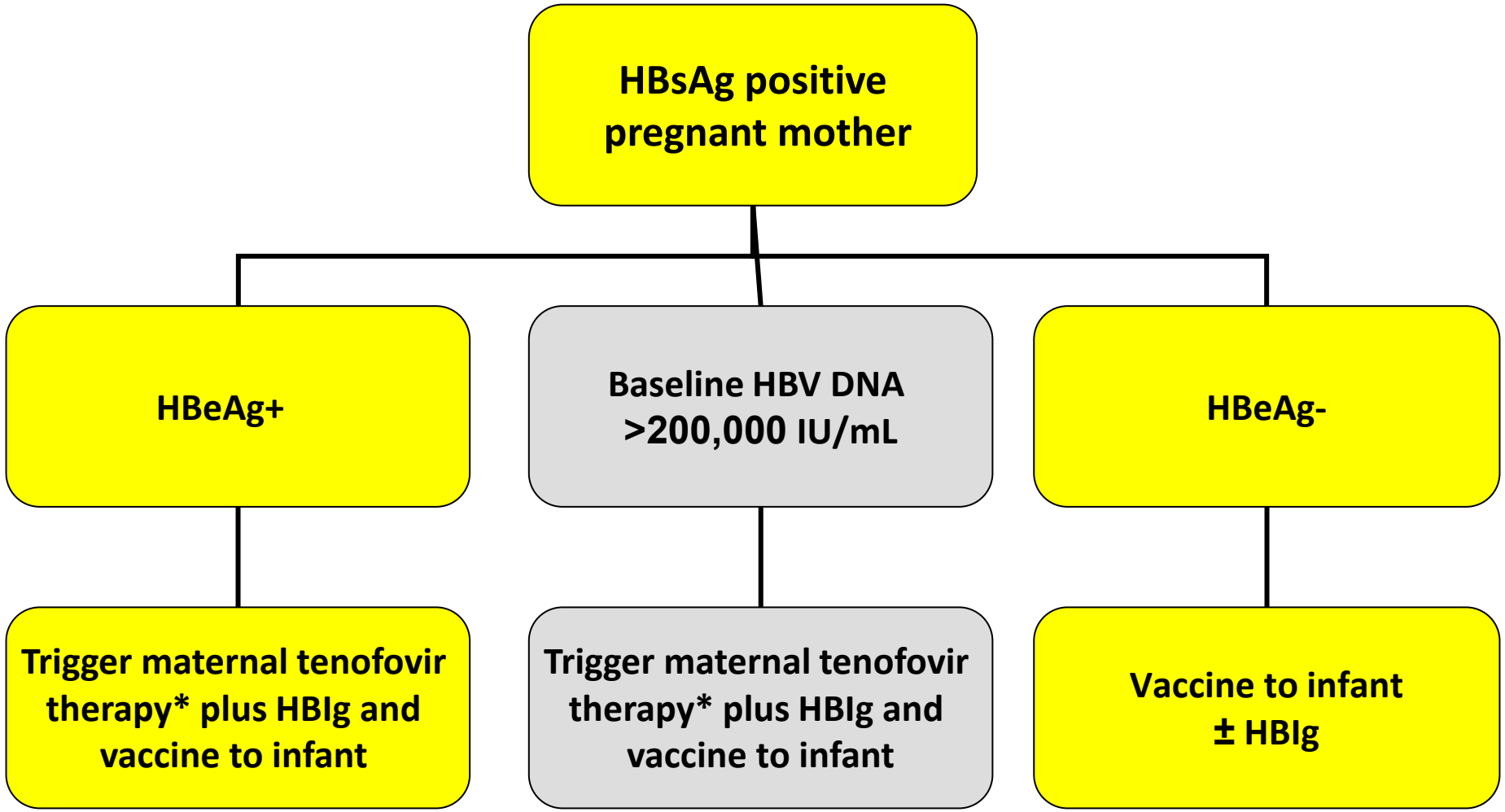
Message 1

- Immunoprophylaxis failure only occurs in infants born to HBeAg positive mothers
- Pregnant females with HBV DNA >200,000 IU/mL at baseline should receive TDF or TAF at 24-28 weeks of gestation to prevent MTCT.
- All newborns should receive HBIg in the delivery room followed by the first dose of hepatitis B vaccine, preferably within 6-12 hours after birth. The birth dose should be followed by 2-3 additional doses of vaccine (0,1 and 6 months or 0,1, 2 and 6 months). The efficacy of HBIg decreases markedly if given more than 48 hours after birth.

Message 2

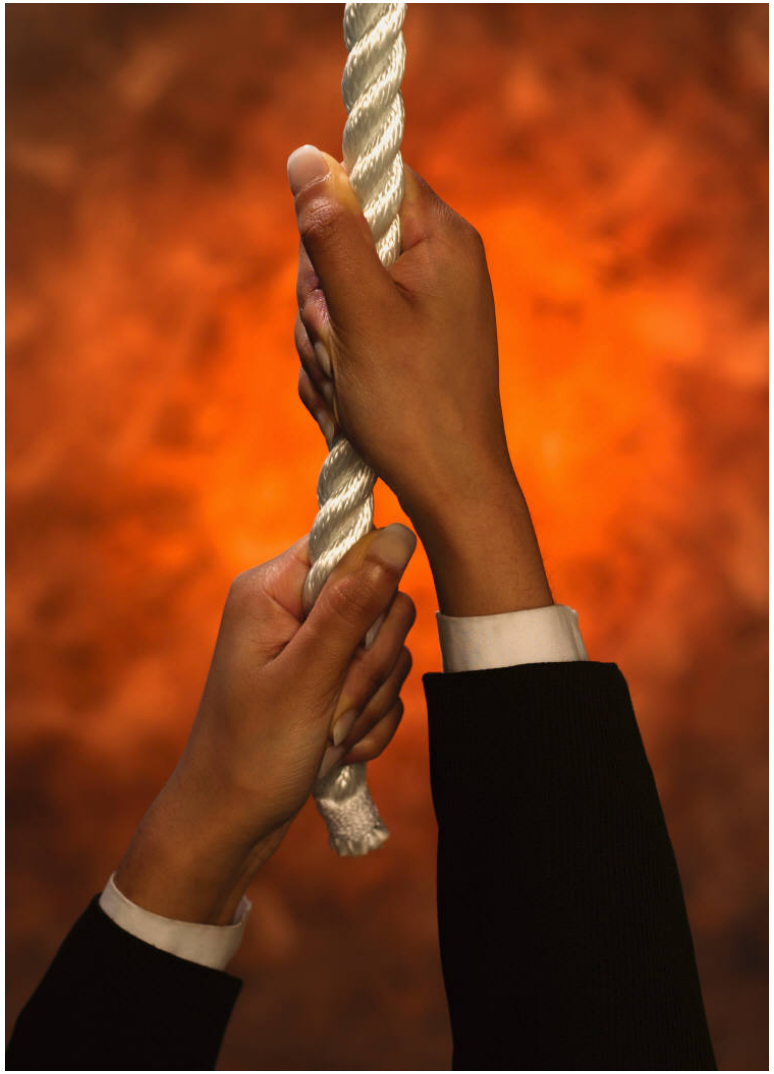
- A very low percentage of infants born each year will become chronically infected with HBV
- Antivirals can be discontinued after delivery or up to 12 weeks postpartum with follow-up for at least 24 weeks to monitor for flares
- Pregnant females with ALT flares during pregnancy or with evidence of advanced fibrosis or cirrhosis should continue antiviral therapy long-term

Simplified Algorithm to Prevent Perinatal Transmission of HBV



*At 24-28 weeks; NNT to prevent one chronic HBV case in the infant is 10-50

The End



Q&A

Texas Perinatal Hepatitis B Summit

May 20, 2022

Adherence to AAP Recommendations for Birth Dose of Hepatitis B Vaccination at a Large Birthing Hospital in Houston, Texas

Neelima Agrawal, MD MPH

Sanjiv Harpavat, MD PhD

Baylor College of Medicine/

Texas Children's Hospital

Texas Perinatal Hepatitis B Summit

May 20, 2022

Adherence to AAP Recommendations for Birth Dose of Hepatitis B Vaccination at a Large Birthing Hospital in Houston, Texas

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The Hepatitis B Vaccine

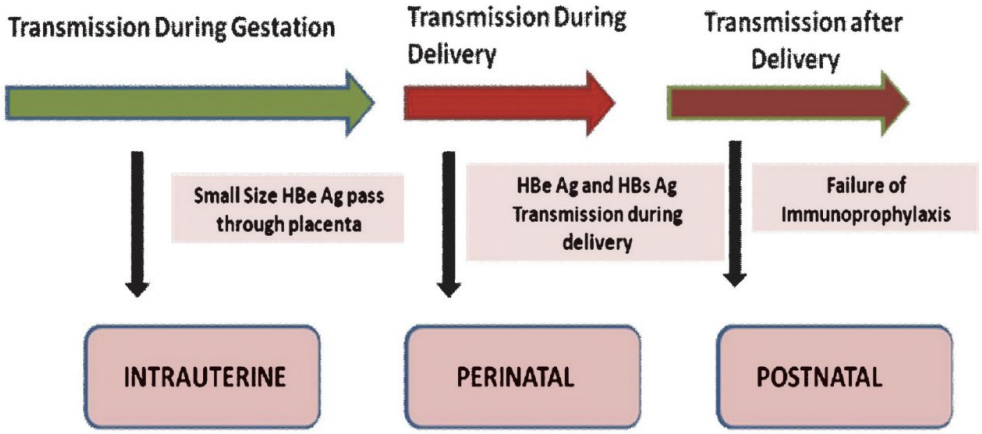
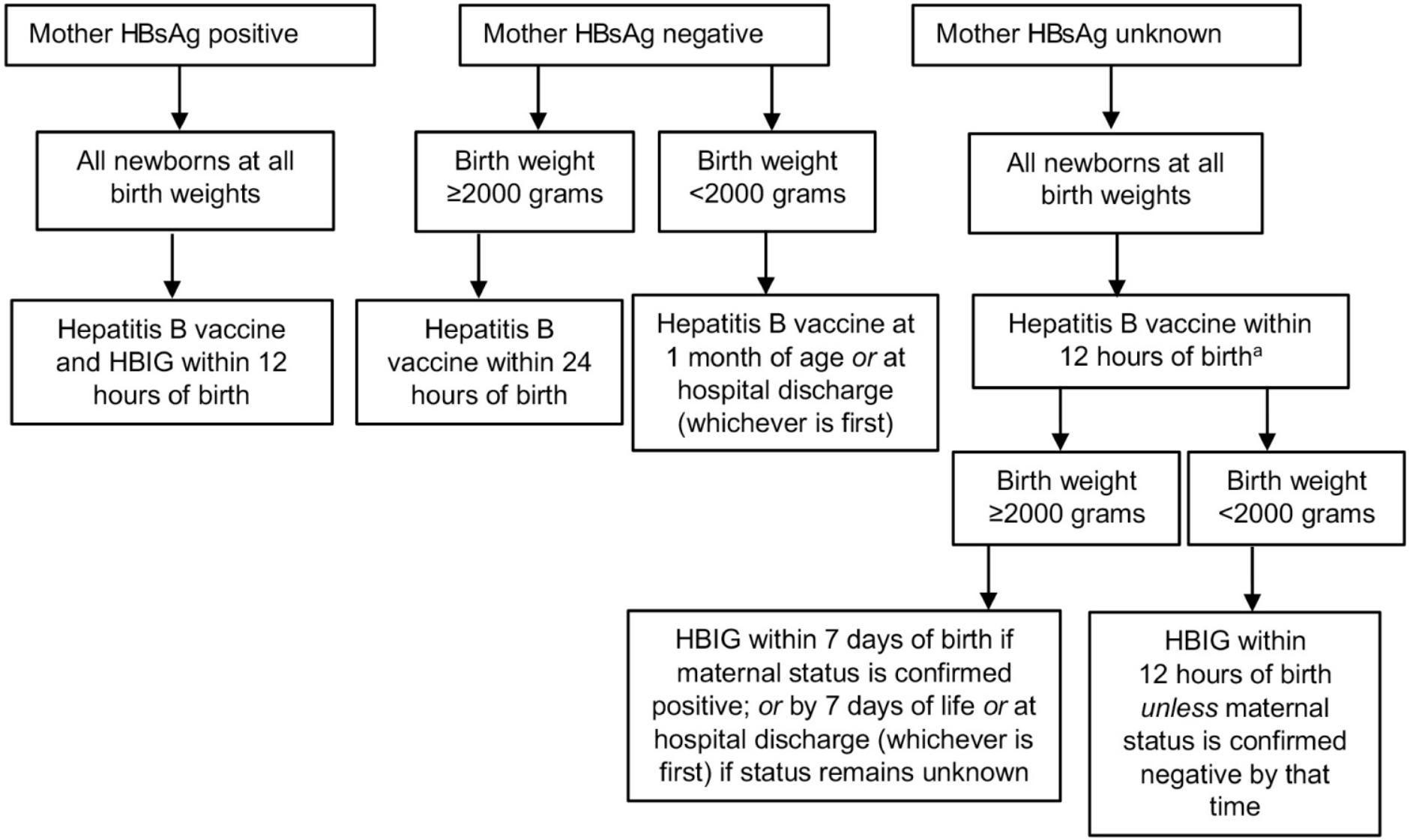
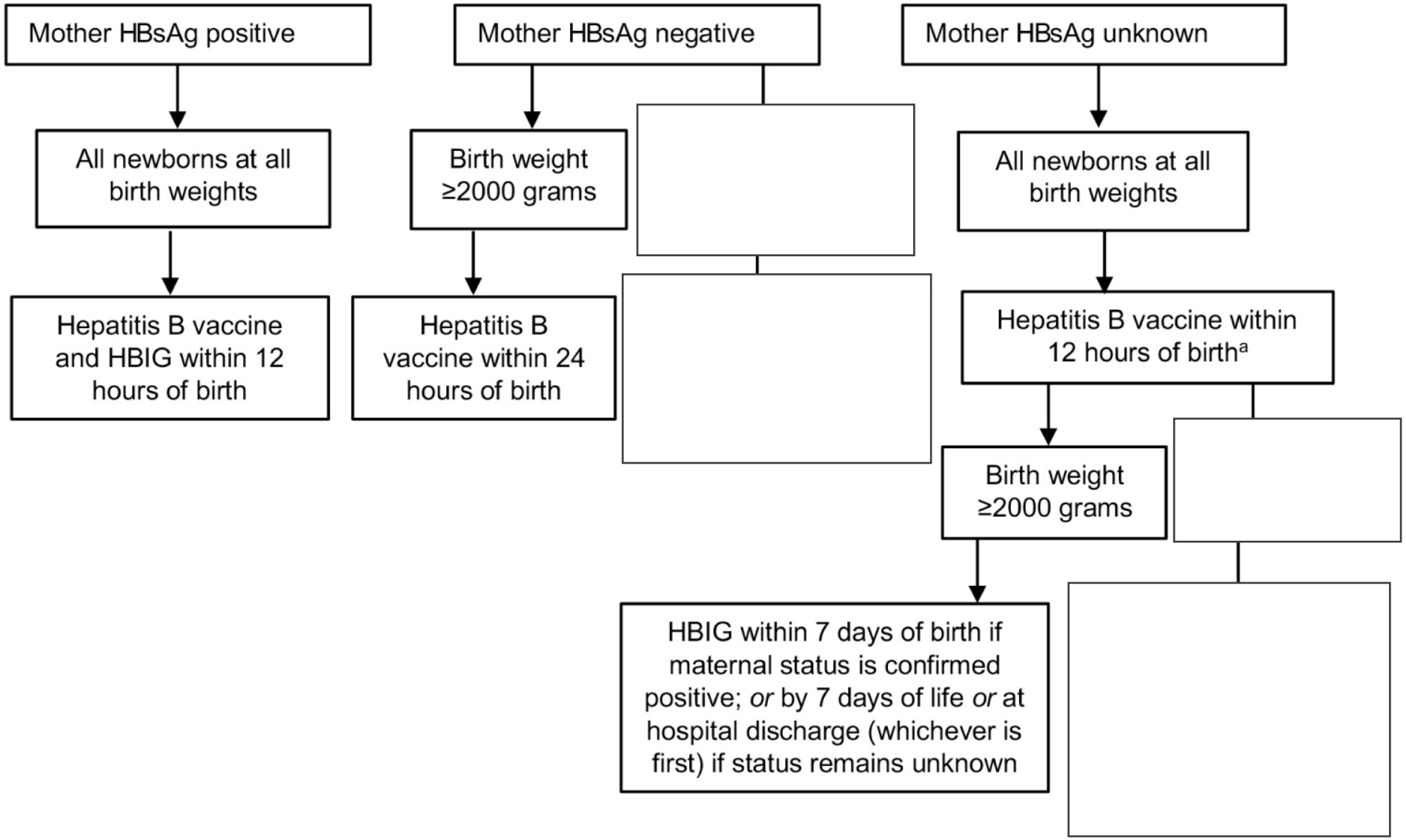


Fig. 1. Secretory proteins crossing the placenta and vertical transmission through during and after delivery.

Trehanpati N, Hissar S, Shrivastav S, Sarin SK. Immunological mechanisms of hepatitis B virus persistence in newborns. *Indian J Med Res*. 2013;138(5):700-710.

- Perinatal infection with Hepatitis B virus (HBV) becomes chronic in 90% of cases with subsequent risk of developing serious liver disease.
- The HBV vaccine is **70-95% effective in preventing perinatal HBV infection** in infants born to HBV carriers (Stevens et al, 2017)
- The **major determinant of the vaccine's effectiveness is an early initial dose**, which serves as the best opportunity to prevent unrecognized perinatal transmissions and unrecognized chronic household transmission within the family (Cui et al, 2010)


Mother HBsAg positive
All newborns at all birth weights
Hepatitis B vaccine and HBIG within 12 hours of birth
Mother HBsAg negative
Birth weight ≥2000 grams
Hepatitis B vaccine within 24 hours of birth
Birth weight <2000 grams
Hepatitis B vaccine at 1 month of age *or* at hospital discharge (whichever is first)
Mother HBsAg unknown
All newborns at all birth weights
Hepatitis B vaccine within 12 hours of birth[a]
Birth weight ≥2000 grams
HBIG within 7 days of birth if maternal status is confirmed positive; *or* by 7 days of life *or* at hospital discharge (whichever is first) if status remains unknown
Birth weight <2000 grams
HBIG within 12 hours of birth *unless* maternal status is confirmed negative by that time


Mother HBsAg positive
Mother HBsAg negative
Mother HBsAg unknown
All newborns at all birth weights
Birth weight ≥2000 grams
All newborns at all birth weights
Hepatitis B vaccine and HBIG within 12 hours of birth
Hepatitis B vaccine within 24 hours of birth
Hepatitis B vaccine within 12 hours of birth[a]
Birth weight ≥2000 grams
HBIG within 7 days of birth if maternal status is confirmed positive; *or* by 7 days of life *or* at hospital discharge (whichever is first) if status remains unknown

Current State

- Country-wide data from the National Immunization Survey has shown that **only ~70% of U.S. infants received the HBV vaccine within 3 days of birth** (Immunization Action Coalition 2020)
- A 2018 Annual Survey of Hospitals completed by the Texas Department of State Health Services (TDSHS) Immunization Unit found **only 83.2% of pregnant women were screened at delivery for HBsAg, and that only 67.9% of infants, born to all women, received the recommended the birth dose of the HBV vaccine within 24 hours of birth**.
- As high as 10% of the hospitals did not have a policy in place with standing order to administer a birth dose to all infants.

Our Aims

1. To determine adherence to AAP guidelines at a large women and children's center over a 3-year period

2. To understand how sociodemographic, perinatal, and maternal characteristics affect HBV vaccination rates and identify barriers to the timely receipt of the HBV birth doses

Methods

- Retrospective cohort study of newborns born from January 2019-December 2021 at Texas Children's Hospital in Houston, Texas (n=19,047).
- All newborns ≥2,000 grams were included and stratified by maternal HBsAg result within 1 week of admission (negative, unknown, or positive by 12 hours of life)
- Univariate analysis was used to identify factors associated with timely receipt of the HBV vaccine and/or immune globulin.

Clinical Characteristics of the Newborn Cohort (n = 19,047)	
Female Sex, n (%)	9120 (48.3)
Mean Birth Weight, grams (±SD)	3283 (±498)
Mean Length, inches (±SD)	19.9 (±1.4)
Mean Gestational Age, weeks (±SD)	38.8 (±1.6)
Maternal Age, years (±SD)	29.7 (± 5.8)
Race, n (%)	
Asian	1325 (7.0)
Black	3950 (20.7)
White	13348 (70.1)
Other	83 (0.4)
Unable to Obtain	341 (1.8)
Ethnicity, n (%)	
Hispanic	7854 (41.2)
Non-Hispanic	11130 (58.4)
Unable to Obtain	63 (0.3)
Preferred Language, n (%)	
English	17391 (91.3)
Spanish	1535 (8.1)
Other	121 (0.6)
Insurance Type, n (%)	
Commercial	9950 (52.2)
Medicaid/Managed Medicaid	8723 (45.8)
None	316 (1.7)
International/Other	58 (0.3)

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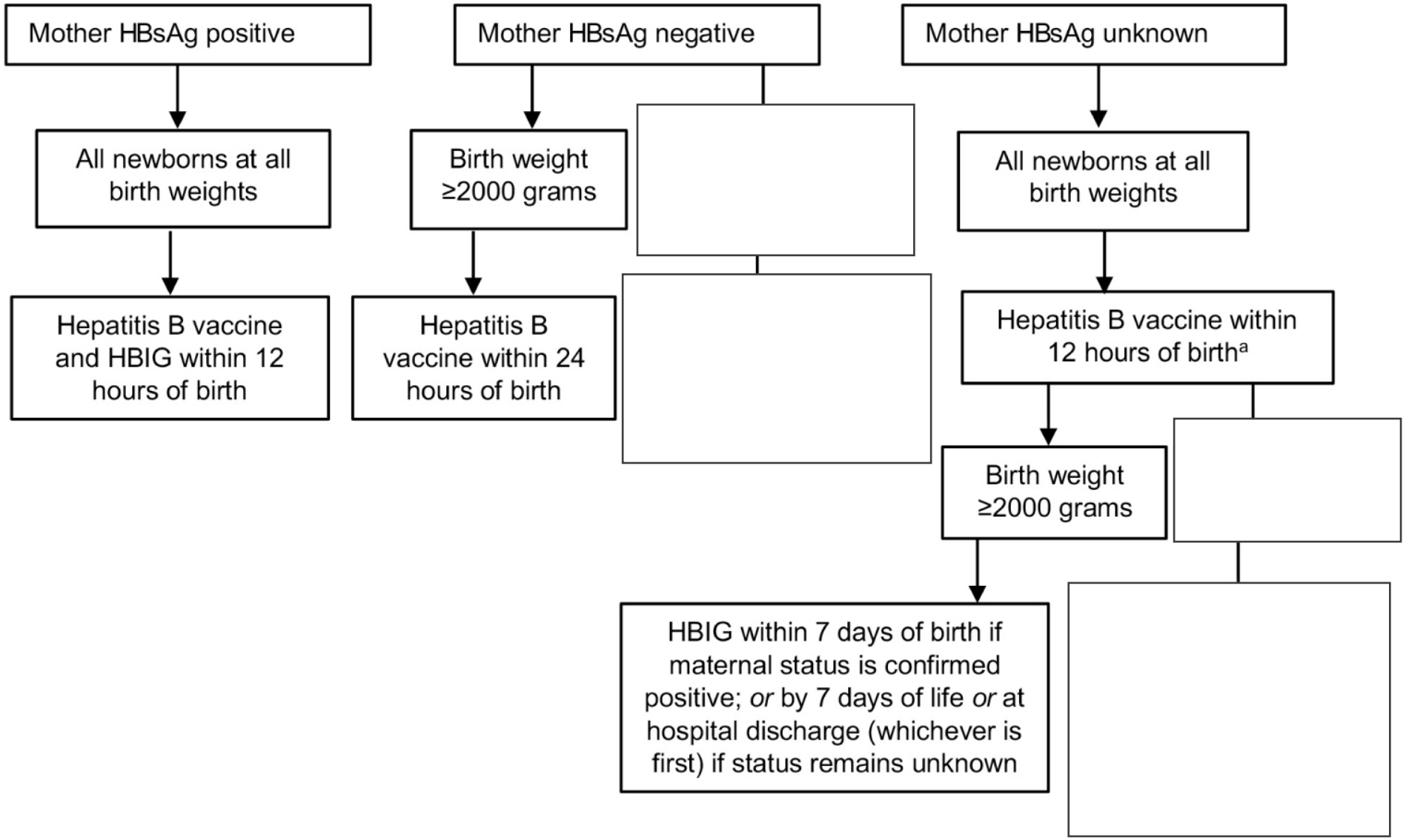
Hospitalization Characteristics of the Newborn Cohort (n = 19,047)	
High Risk Nursery/NICU Hospitalization, n (%)	2812 (14.8)
Length of Stay, days (±SD)	4.1 (±11.9)
Vitamin K Administration, n (%)	18668 (98)
Erythromycin Administration, n (%)	18752 (98.5)


Mother HBsAg positive
Mother HBsAg negative
Mother HBsAg unknown
All newborns at all birth weights
Birth weight ≥2000 grams
All newborns at all birth weights
Hepatitis B vaccine and HBIG within 12 hours of birth
Hepatitis B vaccine within 24 hours of birth
Hepatitis B vaccine within 12 hours of birth[a]
Birth weight ≥2000 grams
HBIG within 7 days of birth if maternal status is confirmed positive; *or* by 7 days of life *or* at hospital discharge (whichever is first) if status remains unknown

Timing of Hepatitis B Vaccination Rates in Newborns ≥ 2,000 grams (2019-2021)

Group 1: Positive Maternal HBsAg (n=39)	
	% (n)
<12 HoL	92.3 (36)
>12 HoL to Discharge	**7.7 (3)**
None Prior to Discharge	0.0 (0)

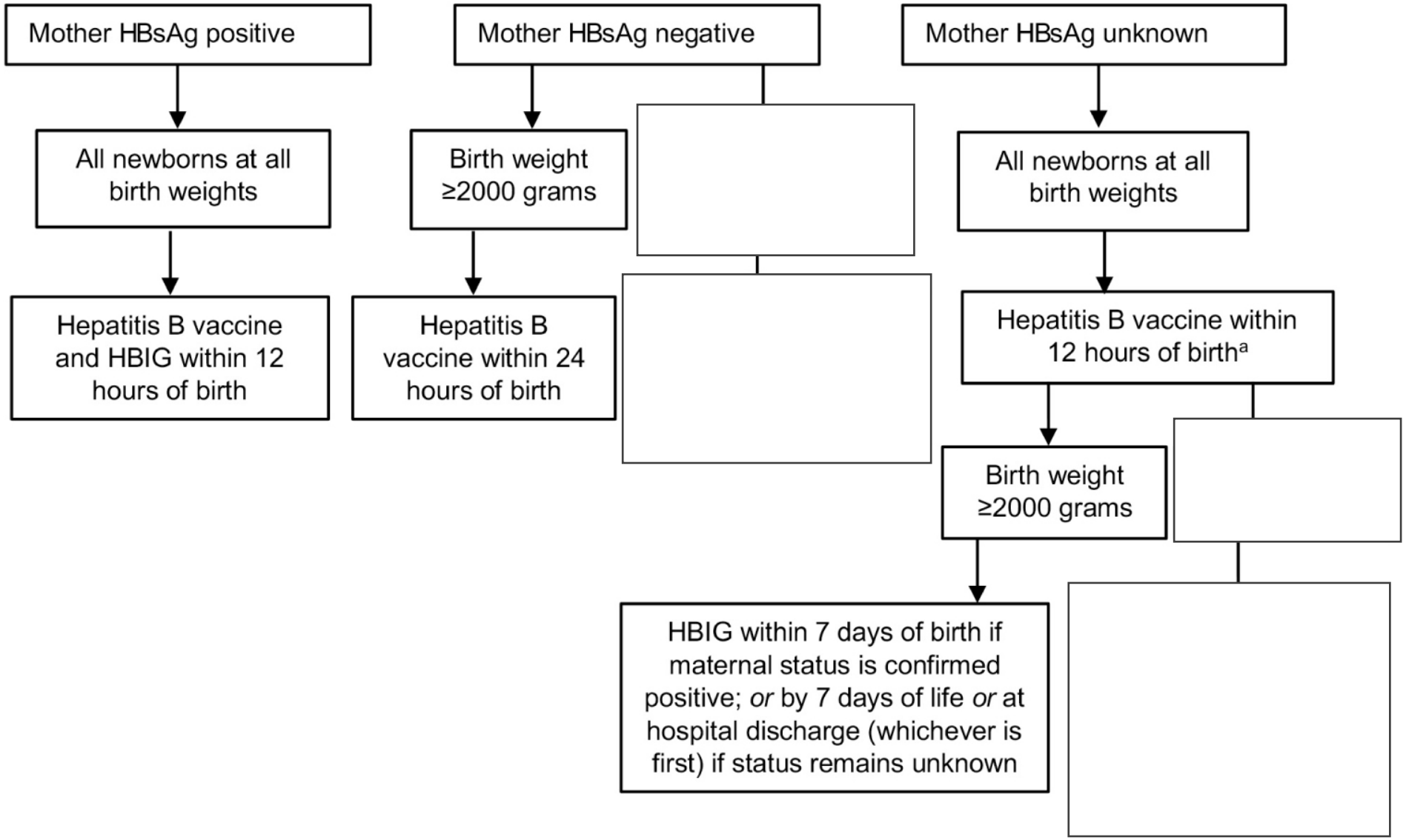
Timing of Hepatitis B Vaccination Rates in Newborns ≥ 2,000 grams (2019-2021)

Group 1: Positive Maternal HBsAg (n=39)		Group 2: Negative Maternal HBsAg (n=18,933)	
	% (n)		% (n)
<12 HoL	92.3 (36)	<24 HoL	71.2 (13,471)
>12 HoL to Discharge	**7.7 (3)**	>24 HoL to Discharge	**22.1 (4,187)**
None Prior to Discharge	0.0 (0)	None Prior to Discharge	6.7 (1275)

Timing of Hepatitis B Vaccination Rates in Newborns ≥ 2,000 grams (2019-2021)					
Group 1: Positive Maternal HBsAg (n=39)		Group 2: Negative Maternal HBsAg (n=18,933)		Group 3: Unknown Maternal HBsAg (n=75)	
	% (n)		% (n)		% (n)
<12 HoL	92.3 (36)	<24 HoL	71.2 (13,471)	<12 HoL	17.3 (13)
>12 HoL to Discharge	**7.7 (3)**	>24 HoL to Discharge	**22.1 (4,187)**	>12 HoL to Discharge	**74.7 (56)**
None Prior to Discharge	0.0 (0)	None Prior to Discharge	6.7 (1275)	None Prior to Discharge	**8.0 (6)**

Unvaccinated Infants

- Infants **not receiving the vaccine prior to discharge** (6.7% n=1,281) were more likely to be **non-Hispanic** ($p<0.001$)**, White** ($p<0.001$), **English-speaking** ($p<0.001$), and **not receive vitamin K or erythromycin** ($p<0.001$).
- Overall deviation from vaccination guidelines was highest in newborns admitted to intensive care units.
- Similar vaccination rates occurred in the period before and during the SARS-CoV-2 pandemic.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Hepatitis B vaccine within 12 hours of birth[a]
Birth weight ≥2000 grams
HBIG within 7 days of birth if maternal status is confirmed positive; *or* by 7 days of life *or* at hospital discharge (whichever is first) if status remains unknown

Timing of Hepatitis B Vaccination (HBV) and Immune Globulin (HBIG) Rates in High Risk Newborns ≥ 2,000 grams (2019-2021)					
Positive Maternal HBsAg (n=39)			Unknown Maternal HBsAg (n=75)		
	HBV	HBIG		HBV	HBIG*
	% (n)	% (n)		% (n)	% (n)
<12 HoL	92.3 (36)	87.1 (34)	<12 HoL	17.3 (13)	1.3 (1)
12-24 HoL	**7.7 (3)**	**7.7 (3)**	12-24 HoL	**37.3 (28)**	2.6 (2)
> 24 HoL	0.0 (0)	0.0 (0)	> 24 HoL	**37.3 (28)**	
None Prior to Discharge	0.0 (0)	**5.1 (2)**	None Prior to Discharge	**8.0 (6)**	

*Amongst the unknown group, 70 maternal serologies resulted negative after 12 hours of life. There was 1 infant with an indeterminate HBsAg, and they received HBV and HBIG at 19 HOL. There were 4 mothers without HBsAg testing during the birth hospitalization; 2 had no prenatal records documented, and 2 had a negative HBsAg during the first trimester. None of their 4 infants received HBIG.

Maternal HBsAg Positive Infants

- 7.7% of infants with positive maternal HBsAg did not receive the HBV vaccine or immune globulin within 12 HoL (n=3)
- Two of three of these infants were admitted to the intensive care setting and instead received delayed receipt at 12-24 HoL

Maternal HBsAg Unknown Infants

- **74.7%** of infants with an **unknown maternal HBsAg by 12 HoL did not receive the HBV vaccine within 12 HoL,** and **8% did not receive it prior to discharge**
- Amongst the unknown group, 93% of maternal serologies resulted negative after 12 HoL
  - 3/5 infants with continued unknown status were admitted to intensive care settings
- Focus on systems in place to optimize more timely receipt of vaccine

Maternal HBsAg Negative Infants

- **22.1%** of infants with **negative maternal HBsAg did not receive the HBV vaccine within 24 HoL,** and **6.7% did not receive it prior to discharge**.
- Patient advocacy and education efforts could be important to improving outcomes and timely receipt within 24 HoL

Takeaways

- Current newborn HBV vaccination practices at a large birthing hospital are not meeting AAP recommendations.
- System-level interventions to improve timely vaccination should target newborns with maternal HBV positive or unknown status first, especially in intensive care settings.
- With only 71.2% of newborns with negative maternal HBsAg receiving the HBV vaccine within 24 HoL, further research into the best implementation strategies for the current AAP recommendations is needed.
- Dialog to increase HBV vaccine acceptance with individual families will also be required to improve overall rates.

Special Thanks to:

Sanjiv Harpavat, MD PhD

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Elizabeth A. Moulton, MD PhD

Julie A. Boom, MD

Tiffany McKee Garrett, MD

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Comments or Questions?

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Q&A

BREAK

Texas Perinatal Hep B Prevention Program Reports

Sarah Auerbach, MPH, Heather Mayfield, MS

Epidemiologist, DSHS

TX PHBPP: Improvements and Limitations in Perinatal Hepatitis B Case Identification

Virtual Perinatal Hepatitis B Prevention Summit, May 2022

Sarah Auerbach, MPH, Heather Mayfield, MS

Epidemiologist, Immunization Unit, ACE Group

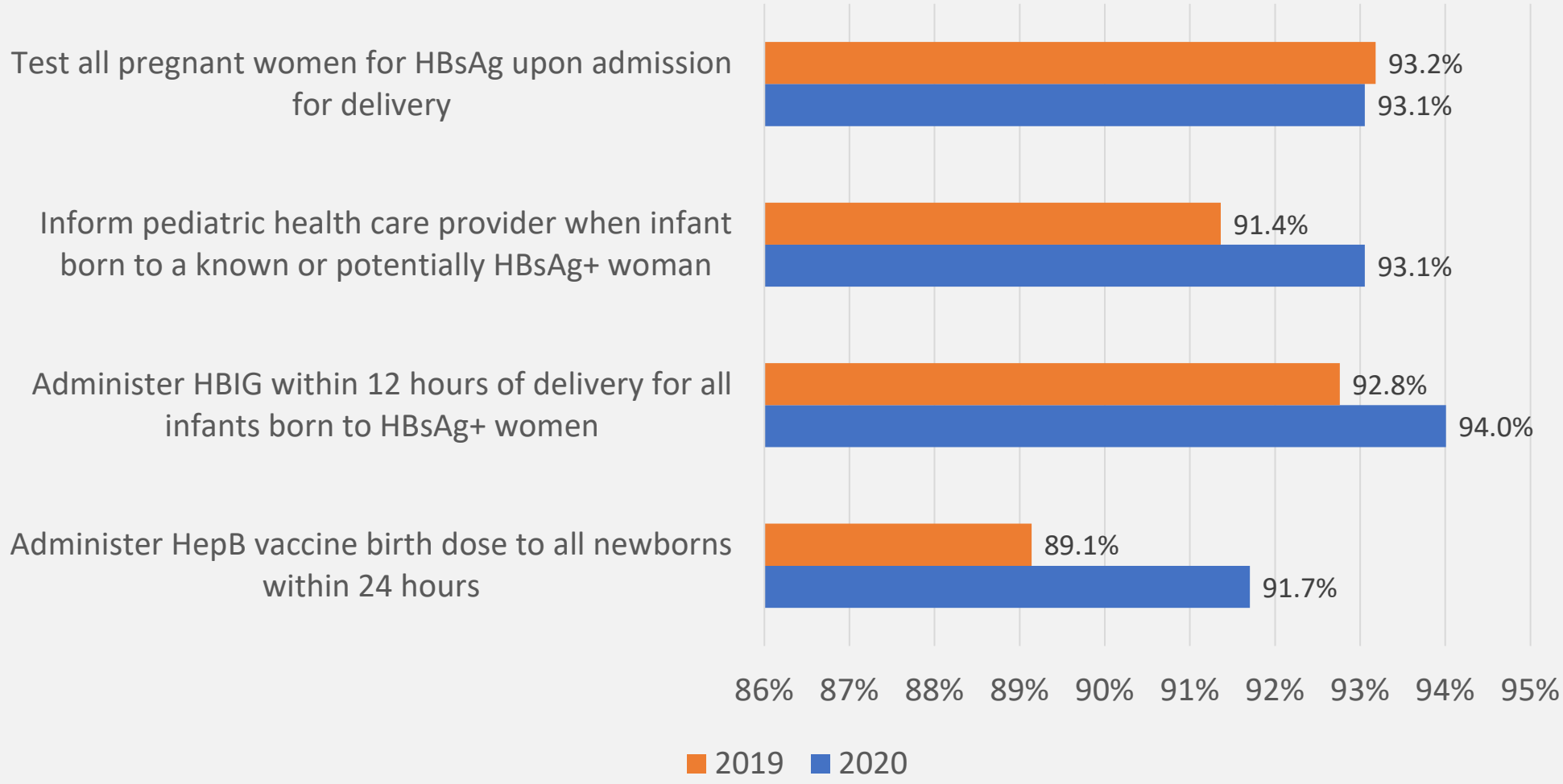
Co-authors: Kelsey Sanders, MPH, CIC; Heather Mayfield, MS

TEXAS Health and Human Services | Texas Department of State Health Services

Overview

- American Hospital Survey
  - Policies
  - Practices
- PHBPP: Objectives, Methods, Outcomes
  - Case definition
  - Surveillance
- Data Sources & Matching
  - Lab tests
  - Birth records
  - Progress & future directions

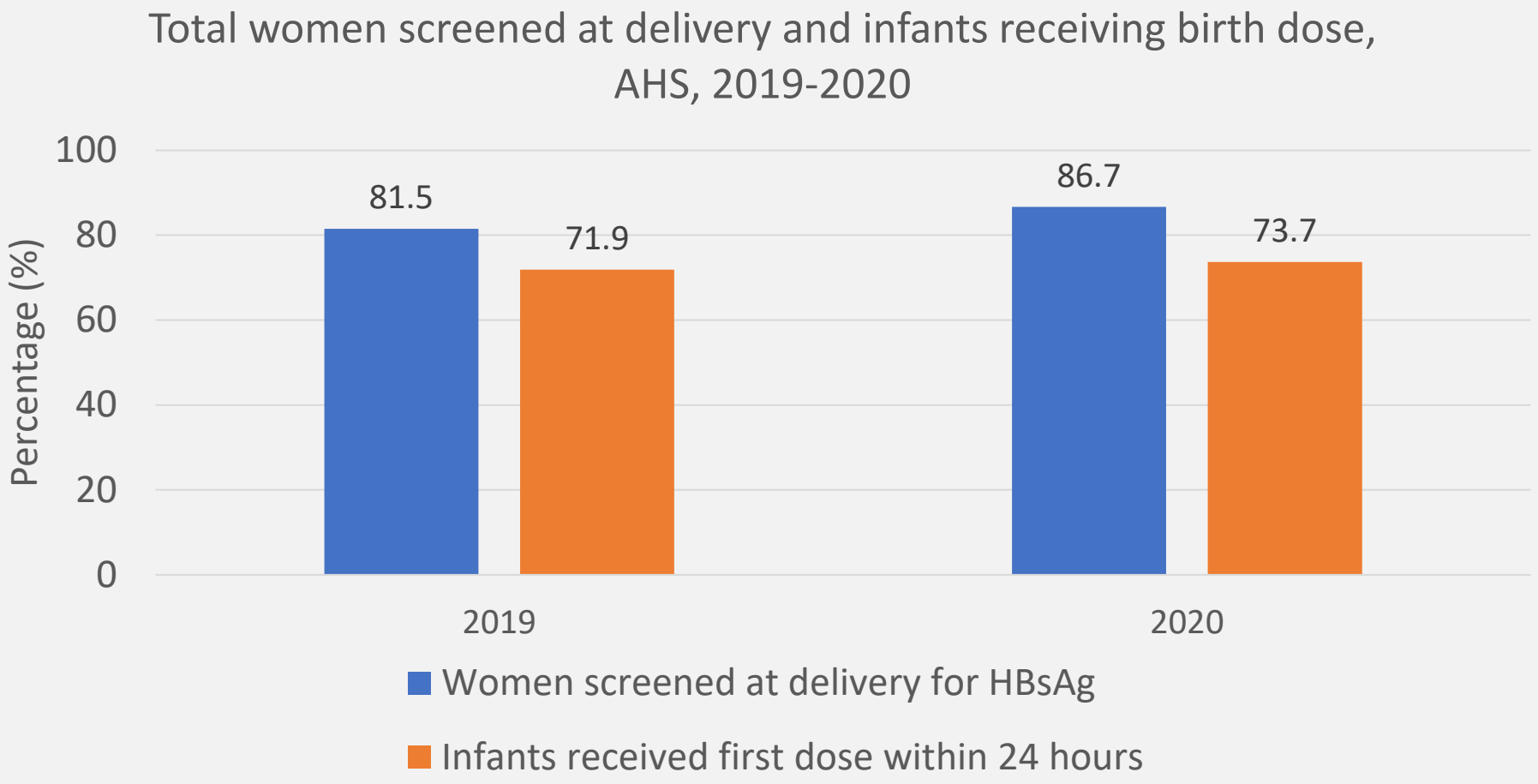
American Hospital Survey: Policies



TEXAS Health and Human Services

Texas Department of State Health Services

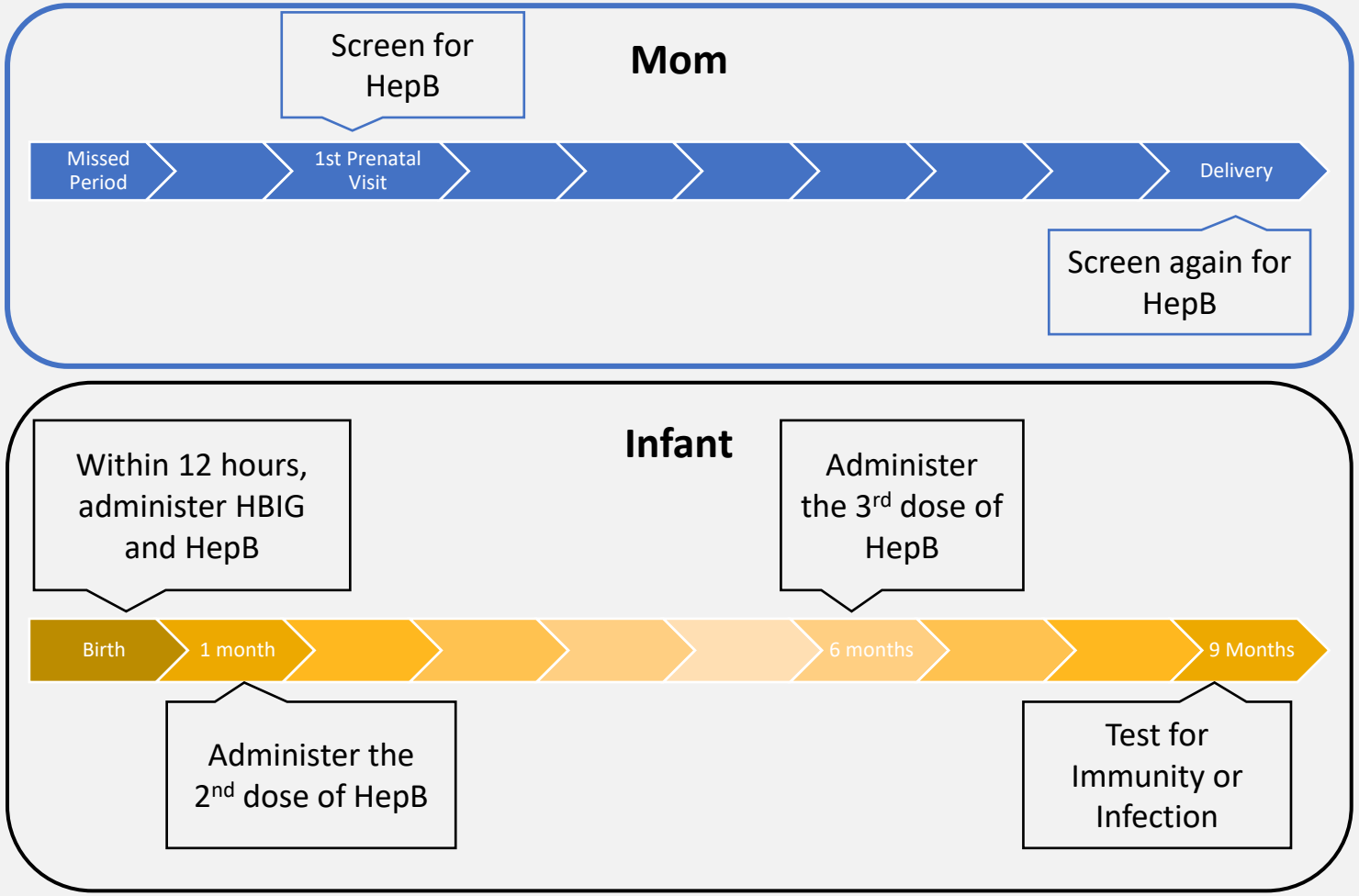
American Hospital Survey: Practice



Future changes to Hospital Survey

- In light of recent ACIP expansion, could ask about a policy and standing orders targeting all unvaccinated adults
- Questions explicitly asking about negative outcomes:
  - How many women were NOT tested for HBsAg at delivery
  - How many infants did NOT receive a HepB birth dose
  - Total number of women admitted for delivery
  - Missed opportunities or patient refusal?

Preventing Perinatal Transmission

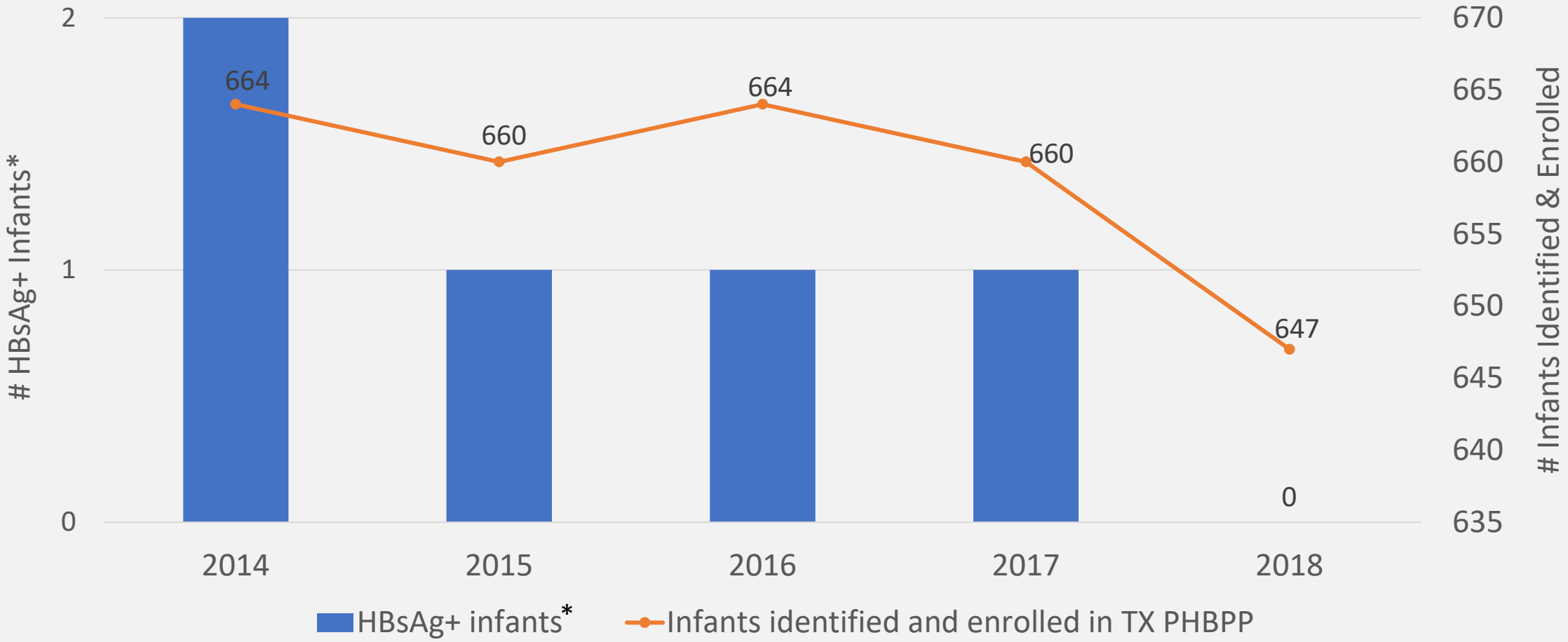


Surveillance Case Definition for Perinatal Hepatitis B Infection

Case Definition	Laboratory Confirmation Tests
Confirmed: Child born in the US to a HBV-infected mother and positive for HBsAg at ≥ 1 month of age and ≤ 24 months of age OR positive for HBeAg or HBV DNA ≥9 months of age and ≤ 24 months of age. ***Probable***: Child born in the US and positive for HBsAg at ≥ 1 month of age and ≤ 24 months of age OR positive for HBeAg or HBV DNA ≥9 months of age and ≤ 24 months of age, but whose mother's hepatitis B status is unknown (i.e. epidemiologic linkage not present).	Hepatitis B surface antigen (HBsAg) positive, hepatitis B e antigen (HBeAg) positive, or detectable Hepatitis B virus DNA (HBV DNA) Note: HBsAg must be tested more than 4weeks after last dose of hepatitis B vaccine to be considered confirmatory.

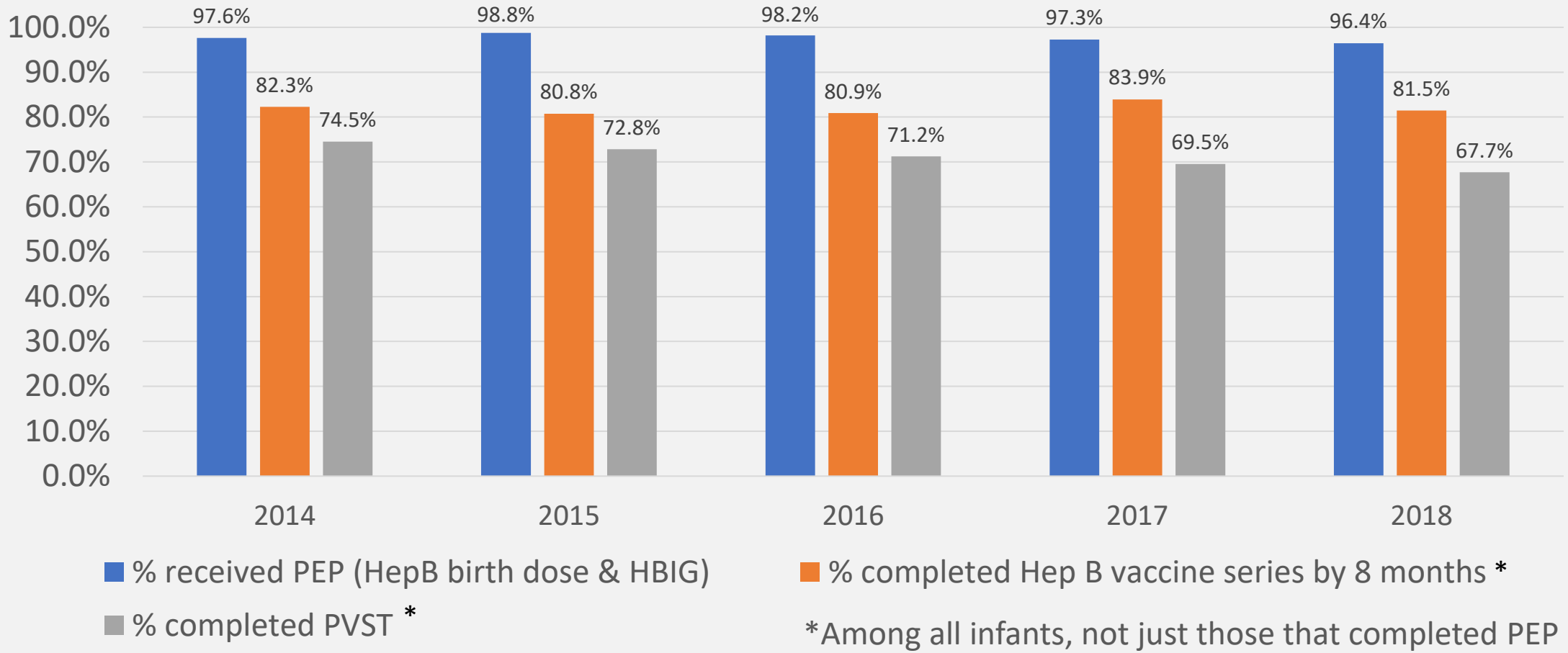
Source: Texas DSHS Epi Case Criteria Guide, 2021

PHBPP: 2014-2018 Surveillance

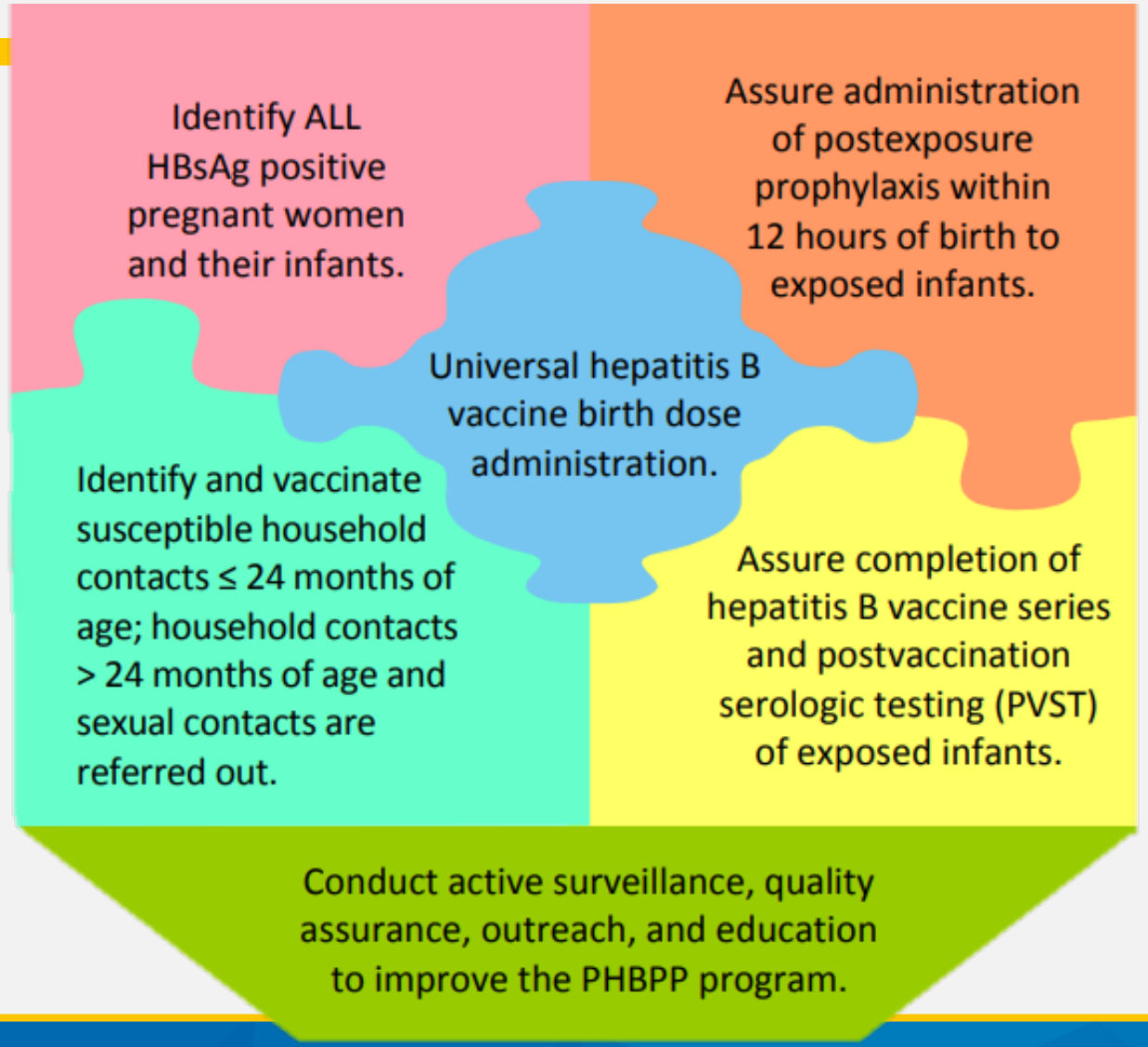


*HBsAg+ infants = those who met case definition, tested positive, and had NOT been enrolled in the PHBPP database

PHBPP: 2014-2018 Birth Cohorts



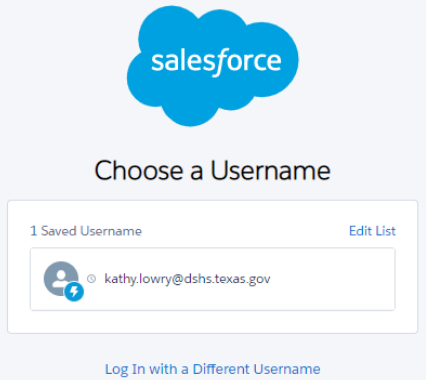
PHBPP Responsibilities

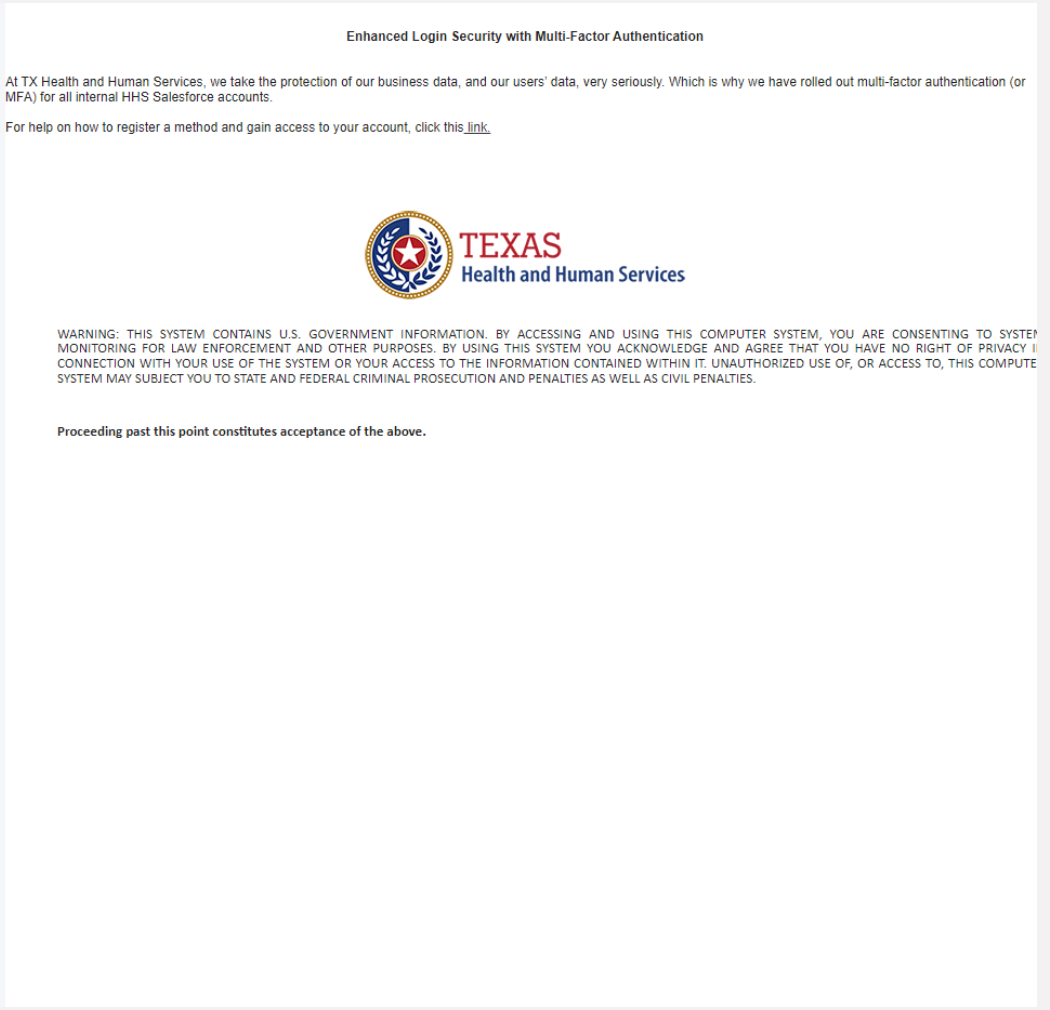


Matching Data from Multiple Sources

- Perinatal Hepatitis B Prevention Program (PHBPP) Database
  - National Electronic Disease Surveillance System (NEDSS) – Lab results from expectant mothers
- Vital Statistics Unit (VSU) Birth Records

Perinatal Hepatitis B Prevention Program (PHBPP) Database





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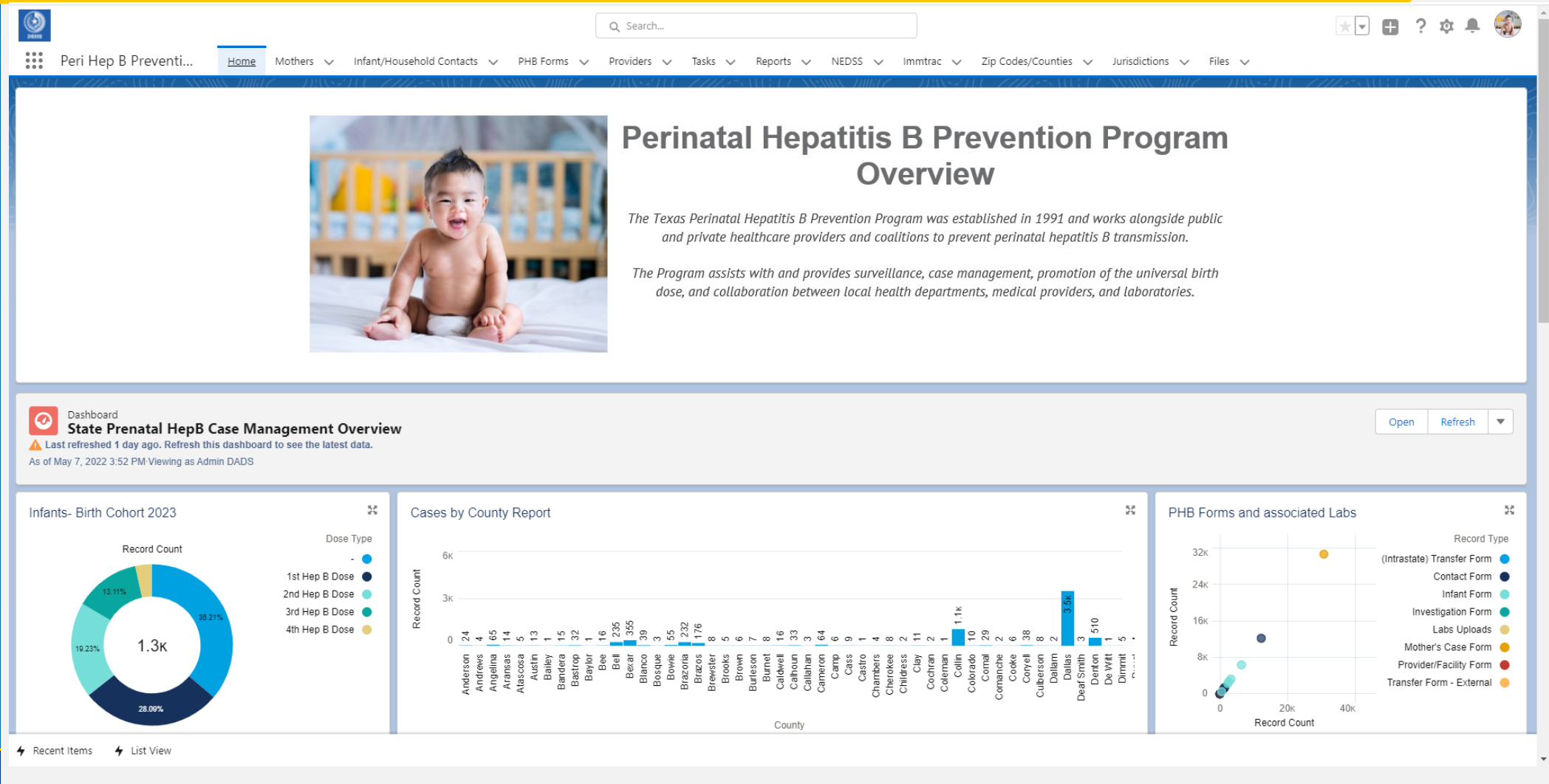
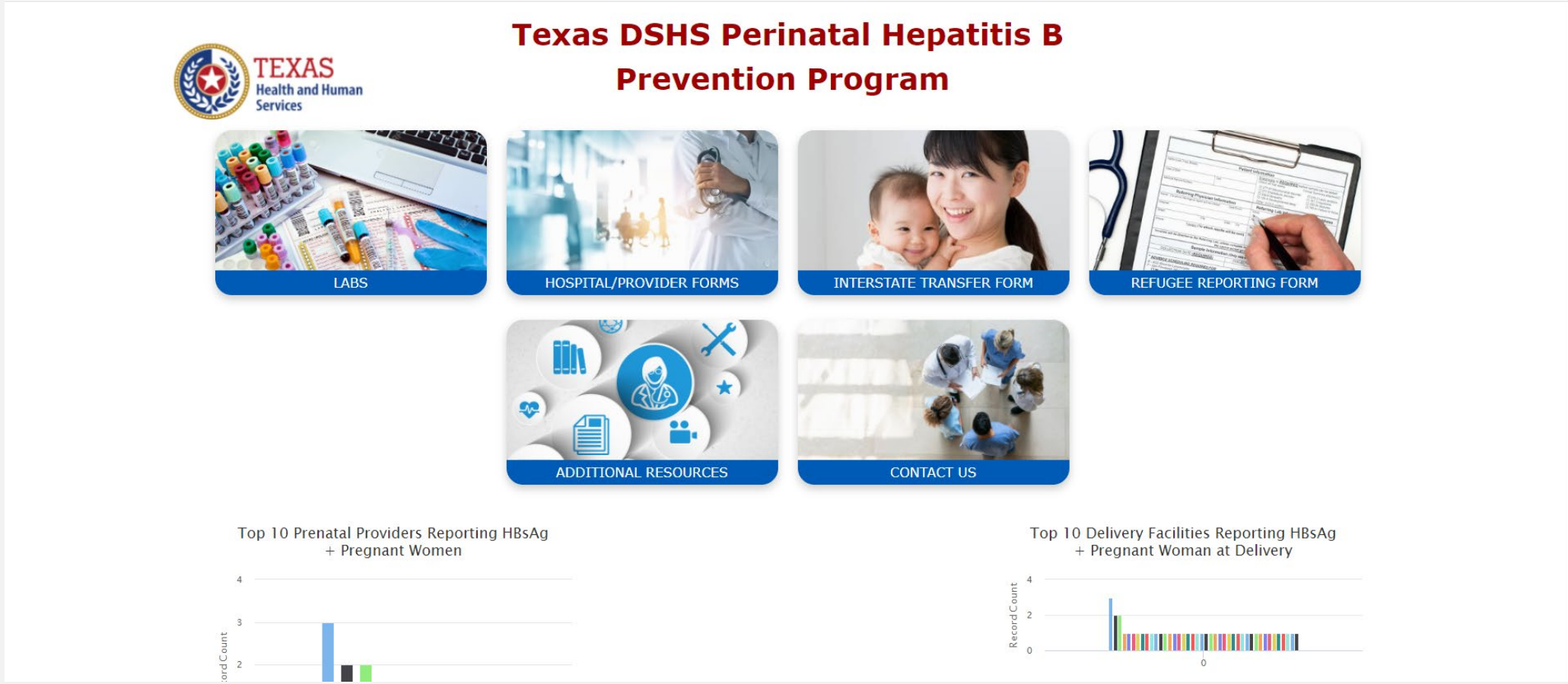
Perinatal Hepatitis B Prevention Program (PHBPP) Database



TEXAS Health and Human Services

Texas Department of State Health Services

Perinatal Hepatitis B Prevention Program Database Public Portal



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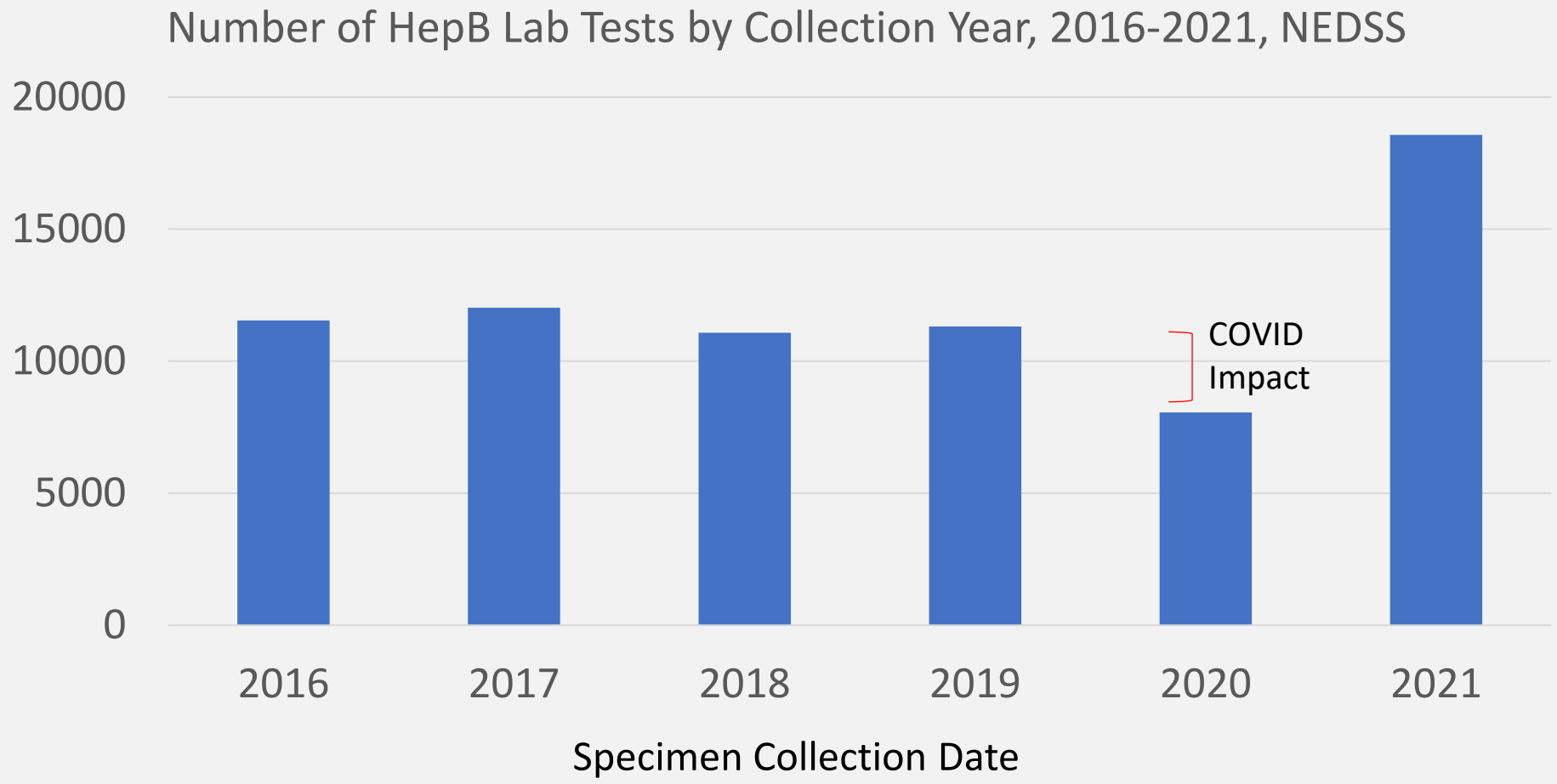
COVID-19 Impact on Hep B Lab Testing



Source: National Electronic Disease Surveillance System, as of 5/6/2022

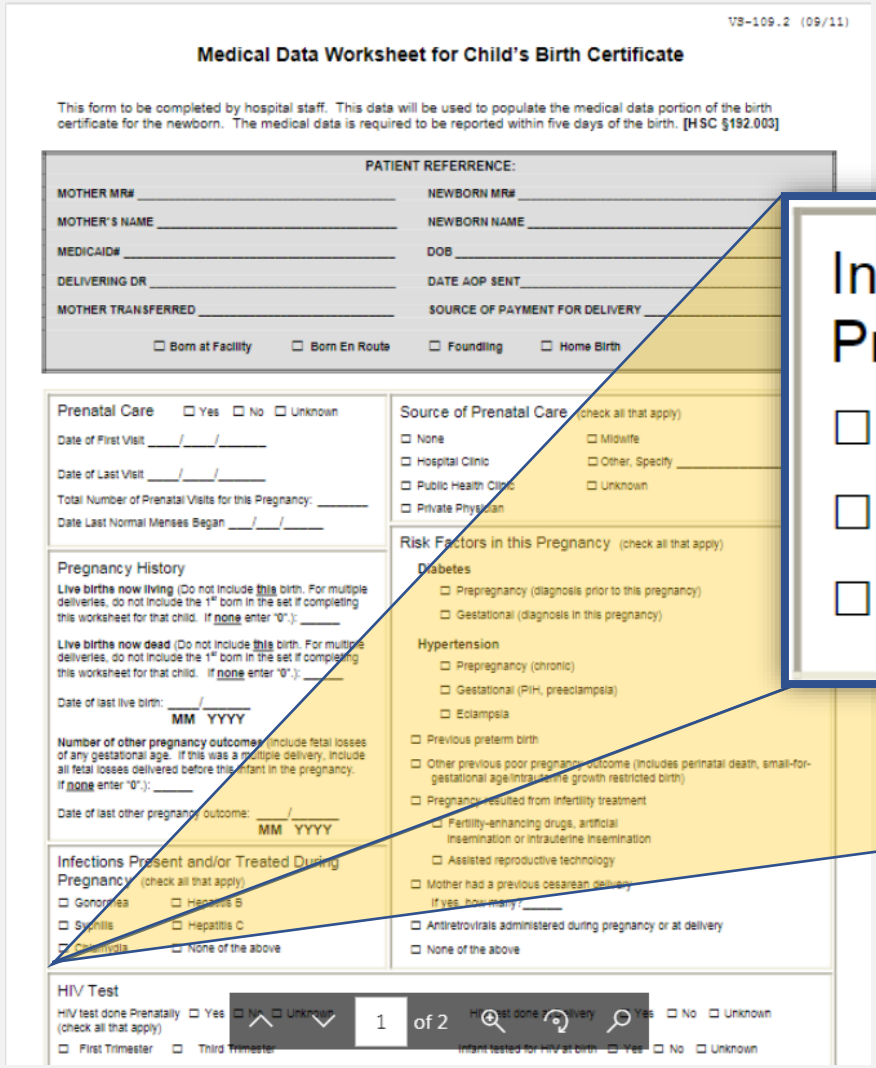
TEXAS Health and Human Services

Texas Department of State Health Services

Monthly Report:
Vital Statistics Unit Report (VSU)

- **Overview**
  - The VSU report is a list of women who indicated that Hepatitis B was a problem during pregnancy on the birth certificate medical worksheet.
- **Purpose**
  - This is another tool CO has to help identify possible HBsAg positive women. Case managers should contact the delivery hospital to verify Hepatitis B status and enroll eligible women in PHBPP.

VSU Medical Data Worksheet



VS-109.2 (09/11)

Medical Data Worksheet for Child's Birth Certificate

This form to be completed by hospital staff. This data will be used to populate the medical data portion of the birth certificate for the newborn. The medical data is required to be reported within five days of the birth. **[HSC §192.003]**

PATIENT REFERRENCE:

MOTHER MR# _____ NEWBORN MR# _____

MOTHER'S NAME _____ NEWBORN NAME _____

MEDICAID# _____ DOB _____

DELIVERING DR _____ DATE AOP SENT _____

MOTHER TRANSFERRED _____ SOURCE OF PAYMENT FOR DELIVERY _____

☐ Born at Facility ☐ Born En Route ☐ Foundling ☐ Home Birth

Prenatal Care ☐ Yes ☐ No ☐ Unknown

Date of First Visit ____/____/_____

Date of Last Visit ____/____/_____

Total Number of Prenatal Visits for this Pregnancy: _____

Date Last Normal Menses Began ___/___/_____

Source of Prenatal Care (check all that apply)

☐ None ☐ Midwife

☐ Hospital Clinic ☐ Other, Specify _____

☐ Public Health Clinic ☐ Unknown

☐ Private Physician

Pregnancy History

Live births now living (Do not include this birth. For multiple deliveries, do not include the 1st born in the set if completing this worksheet for that child. If none enter "0".): _____

Live births now dead (Do not include this birth. For multiple deliveries, do not include the 1st born in the set if completing this worksheet for that child. If none enter "0".): _____

Date of last live birth: ____/_____ MM YYYY

Number of other pregnancy outcomes (include fetal losses of any gestational age. If this was a multiple delivery, include all fetal losses delivered before this infant in the pregnancy. If none enter "0".): _____

Date of last other pregnancy outcome: ____/_____ MM YYYY

Risk Factors in this Pregnancy (check all that apply)

Diabetes

☐ Prepregnancy (diagnosis prior to this pregnancy)

☐ Gestational (diagnosis in this pregnancy)

Hypertension

☐ Prepregnancy (chronic)

☐ Gestational (PIH, preeclampsia)

☐ Eclampsia

☐ Previous preterm birth

☐ Other previous poor pregnancy outcome (includes perinatal death, small-for-gestational age/intrauterine growth restricted birth)

☐ Pregnancy resulted from infertility treatment

☐ Fertility-enhancing drugs, artificial insemination or intrauterine insemination

☐ Assisted reproductive technology

☐ Mother had a previous cesarean delivery

If yes, how many? _____

☐ Antiretrovirals administered during pregnancy or at delivery

☐ None of the above

Infections Present and/or Treated During Pregnancy (check all that apply)

☐ Gonorrhea ☐ Hepatitis B

☐ Syphilis ☐ Hepatitis C

☐ Chlamydia ☐ None of the above

HIV Test

HIV test done Prenatally ☐ Yes ☐ No ☐ Unknown (check all that apply)

☐ First Trimester ☐ Third Trimester

HIV test done at Delivery ☐ Yes ☐ No ☐ Unknown

Infant tested for HIV at birth ☐ Yes ☐ No ☐ Unknown

1 of 2

Infections Present and/or Treated During Pregnancy (check all that apply)

☐ Gonorrhea ☐ Hepatitis B

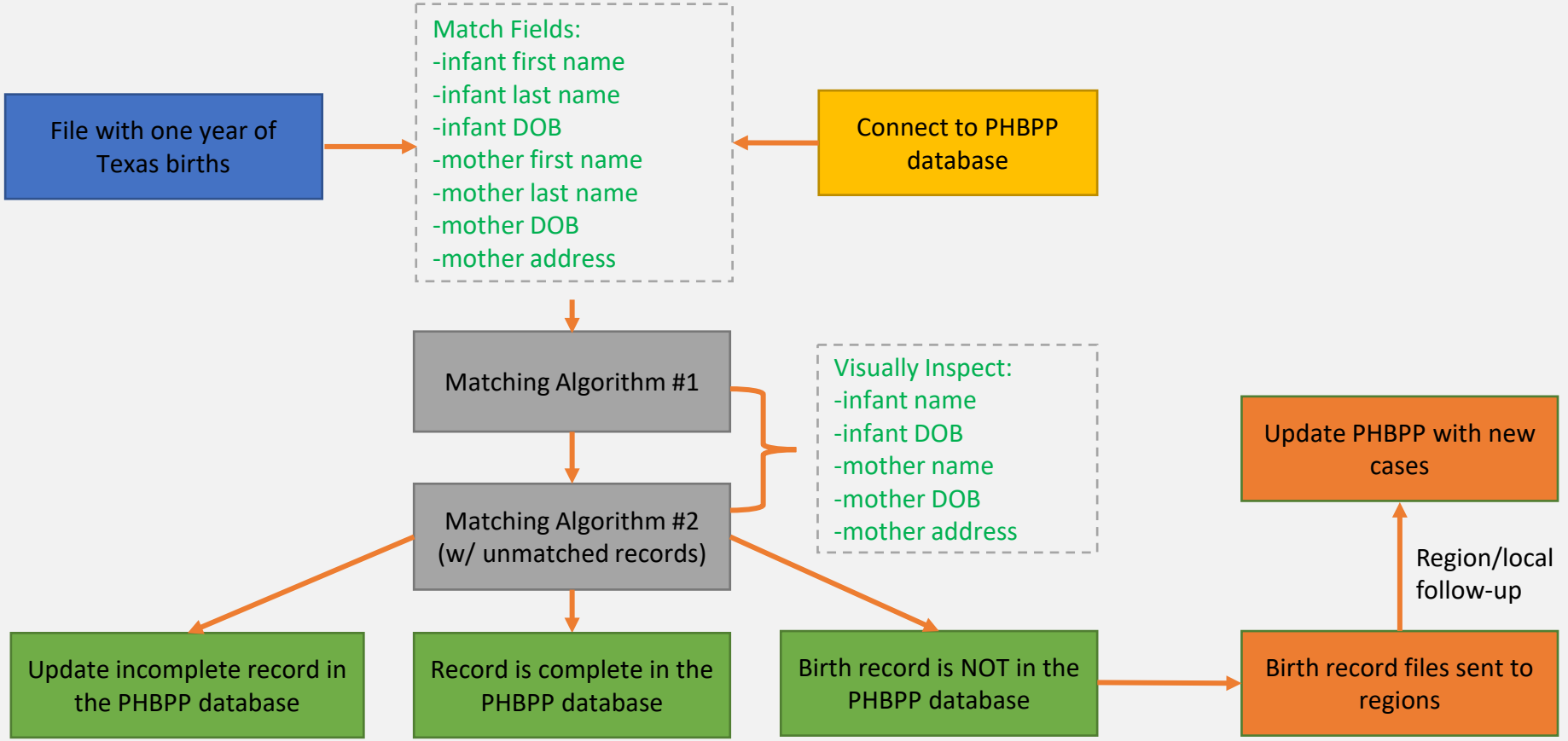
☐ Syphilis ☐ Hepatitis C

☐ Chlamydia ☐ None of the above

How PHBPP Uses Birth Records

- Monthly file with data for all births
- Identify unreported moms with hepatitis B infection during pregnancy
  - Investigate!
- Match to mother-infant pairs already identified and fill in missing information
  - E.g. Infant's first name

Matching Process



Matching Process

***SOUNDEX* function**

1) Retain the 1st letter
2) Discard A E H I O U W Y
3) Recode
   - 1: B F P V
   - 2: C G J K Q S X Z
   - 3: D T
   - 4: L
   - 5: M N
   - 6: R
4) If two or more adjacent lets have the same recode value, then discard all but the first

*Better for English names

VIEWTABLE: Work.Name_test

	Name	sname
1	Jessica	J22
2	Jessika	J22
3	Jesica	J22
4	Jess	J2
5	Jessie	J2
6	Hessica	H22
7	Sessica	S22
8	Anne	A5
9	Ann	A5
10	Annie	A5
11	Anna	A5
12	Annabelle	A514
13	Annabell	A514
14	Anny	A5

Matching Process

***COMPGED* function**

- Lower values indicate better matches
- Similar SAS functions: ***COMPLEV*** and ***SPEDIS***

VIEWTABLE: Work.Compged_test

	Name1	Name2	score
1	Jessica	Jessica	0
2	Jessica	Jessicaa	10
3	Jessica	Jess ica	10
4	Jessica	Jesica	20
5	Jessica	Jesscia	20
6	Jessica	Jessika	100
7	Jessica	Jess	150
8	Jessica	Jessie	150
9	Jessica	Jennifer	410
10	Jessica	Marie	650
11	Jessica	Linda	700

Match On (iterative process)

- Mom's DOB
- Mom's First to First Name (Soundex)
- Mom's Last to Last Name (Soundex)
- Mom's First to Last Name (Soundex)
- Mom's Last to First Name (Soundex)
- Etc with COMPGED Scores for each
- De-duplication

NEDSS+PHBPP+VSU Database

- Lab Results
  - Hep B surface antigen test
  - In a specific date range (weekly for the week before)
  - Not male (female or unknown, very small unknown number)
  - Of childbearing age
- Match against the PHBPP Database
  - if mom not there, route for follow up
- Match against all VSU Birth Records

Progress Made

New PHBPP Database

- Import data from NEDSS into new PHBPP database housed within SalesForce
  - Capture more lab results
  - Phase out manual export/import

Integration with Vital Stats

- New DUA with Vital Stats to catch cases not entered in NEDSS

Future Possibilities

- Explore other options such as CDC Link Plus or Match*Pro
- Continue to track progress
- Look at demographics
- ImmTrac HBIG administration vs. PHBPP database

Thank you!

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Q&A

Closing Remarks

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Thank you!

2022 Perinatal Hepatitis B Summit

Please contact our Nurse Coordinator, Kathy Lowry at kathy.lowry@dshs.Texas.gov with any questions.