

Impacts of Declining Hepatitis B Vaccine Birth Dose on Future Immunization Uptake

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ABSTRACT

BACKGROUND: Childhood vaccination remains one of the most effective public health interventions, yet recent national declines in coverage and rising vaccine hesitancy threaten these achievements. Hepatitis B (HepB) birth dose administration is an early predictor of parental adherence to future immunization schedules. We examined recent trends in Rhode Island (RI) HepB birth dose coverage and their relationship to subsequent vaccine completion and school-entry compliance.

METHODS: We identified the immunization records of RI resident infants born in RI hospitals from 2019 through mid-2025 in the Rhode Island Child and Adult Immunization Registry (RICAIR), and categorized them by timing of initial HepB vaccination: birth dose prior to discharge; early well visit dose; or no dose by 3 months of age in order to compare combined 7-series completion by 24 months and kindergarten immunization. Recent trends were then used to model projected future coverage.

RESULTS: HepB birth dose coverage declined abruptly to 84.2% by Q2 2025. Infants who received a HepB birth dose were more likely to meet kindergarten immunization requirements (91.1%) compared with those vaccinated later (81.8%) or not by 3 months (10.1%). Projections suggest statewide kindergarten compliance could decline from 88.8% to 85.3% if current trends persist.

CONCLUSIONS: The accelerating decline in HepB birth dose administration in RI is an early warning sign of eroding vaccine confidence and adherence. Coordinated, cross-sector interventions linking public health, prenatal, and pediatric care are urgently needed to reverse this trend and sustain high early childhood immunization coverage.

KEYWORDS: Hepatitis B vaccine; birth dose; immunization coverage; vaccine hesitancy; childhood vaccination

INTRODUCTION

Childhood vaccination remains one of the most effective public health interventions, preventing millions of cases of infectious diseases each year.¹ However, in recent years,

U.S. childhood vaccination rates have plateaued in some parts of the U.S. and even declined in others, due in part to the growing influence of vaccine hesitancy.^{2,3} Delays or refusals in vaccination have been linked to outbreaks of vaccine-preventable diseases across the country.^{4,5} Rhode Island (RI) has been less affected by these developments than some other parts of the country, but below we provide evidence of emerging warning signs.

Hepatitis B (HepB) birth doses can serve as a bellwether for surveillance of changing parental decisions regarding pediatric immunization. Even after nirsevimab was recommended to reduce risk of Respiratory Syncytial Virus (RSV) in October 2023, administration is seasonal, therefore HepB remains the only vaccine universally recommended prior to discharge from the hospital. The Advisory Committee on Immunization Practices (ACIP) first recommended a universal HepB birth dose in 1991,⁶ but neonatal HepB vaccination rates in the United States have remained suboptimal, with only 81.5% of infants born between 2019 and 2020 receiving the birth dose,⁷ below the Health People 2020 goal of 85%.⁸

Suboptimal birth dose rates are of concern not only because of increased risk of perinatal HepB but also because they serve as a predictor of future vaccination adherence.^{9,10} Analyses using state immunization registries¹¹⁻¹³ and national survey data¹⁴ have shown that infants whose parents postpone the HepB birth dose are less likely to receive routinely recommended vaccines between 19 and 35 months of age.

The current study, therefore, aims to a) describe recent trends in RI HepB birth dose rates; b) identify rates of Combined 7 series completion by 24 months and Kindergarten immunization compliance children currently age-eligible who did and did not receive a HepB birth dose; and c) on the basis of those rates, model likely future overall compliance in light of recent birth dose trends.

METHODS

KIDSNET is RI's integrated child health data system, through which healthcare providers and other authorized users can access health data to assure the provision of appropriate preventive health services. KIDSNET also enables RIDOH to exercise public health surveillance to identify trends, areas of shortfalls in preventive care, and differential receipt of preventive care among subpopulations. A major component

of KIDSNET is the Rhode Island Child and Adult Immunization Registry (RICAIR), RI's immunization information system. RI providers submit data on administered vaccines; since 2022, RICAIR also includes vaccines administered in a growing number of other jurisdictions including MA, CT, NYC, and FL.

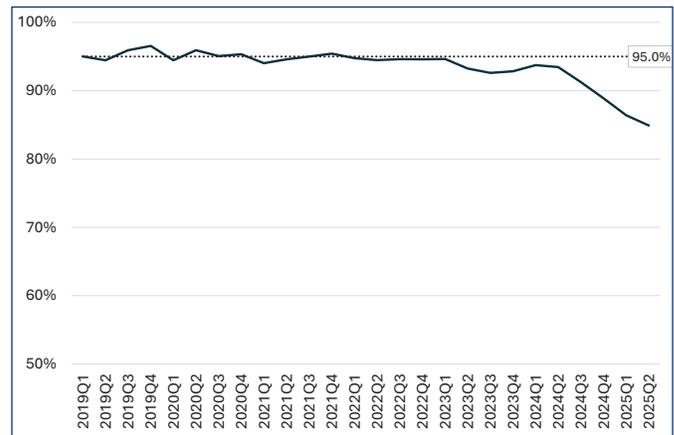
We used birth certificate data in KIDSNET to identify deliveries of RI residents in RI hospitals from 2019 through June of 2025, where the infant was discharged from the hospital. We then merged all Hepatitis B vaccine administration data during that period and used the infant's hospital discharge date to determine whether a birth dose was administered prior to discharge. (As of 2018, clinical guidelines call for administration within 24 hours; in order to assess birth dose receipt more generally, we included all doses administered prior to the date of discharge.) Guidelines indicate that infants with birth weight <2000 grams to a mother with confirmed negative Hepatitis B can be vaccinated either up to 1 month of age or prior to discharge; those infants were excluded from calculations of birth dose rates although included in the calculations of well visit vaccination, as were a small number of infants born in a hospital other than a newborn nursery.

For infants who did not have a birth dose prior to discharge, we then investigated whether the infant received a HepB dose at a well visit before 3 months of age, resulting in three final categories: infants who received a birth dose, infants who received a first dose at an infant well visit, and infants with no HepB vaccine on record by 3 months. We then subset children who were at least 24 months of age at the time of analysis and calculated the proportion in each category who had the combined 7-vaccine series¹⁵ complete by age 24 months. In order to compare kindergarten requirement compliance rates across the three categories, we also created a "historical" cohort of children 5.0–6.5 years old. Finally, we applied those rates to estimate the probable impact on future overall toddler and kindergarten vaccine compliance of the most recent birth dose rates. The analysis was deemed exempt from the RIDOH Institutional Review Board as an extension of normal public health surveillance activities.

RESULTS

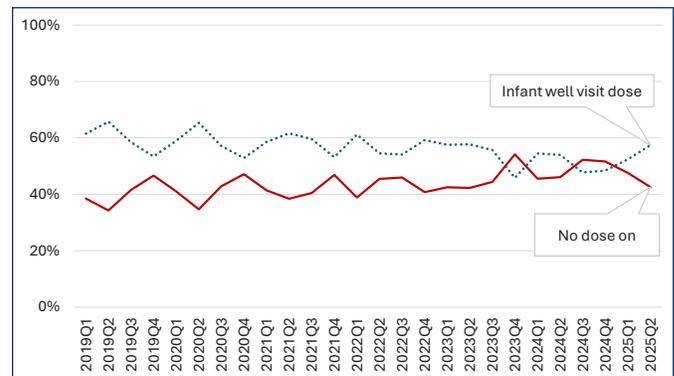
From 2019 through Q1 2023, there was only one calendar quarter when HepB birth dose coverage in Rhode Island fell below 94.5% [Figure 1]. Starting in Q2 2023, coverage was consistently below 94%, with sharp decreases starting Q3 2024 down to 84.2% in Q2 2025. Among the increasing proportion of infants who did not receive a birth dose, quarter-to-quarter trends fluctuated somewhat more but the percent of infants receiving a well visit dose trended downward [Figure 2]. As a result, the proportion of all infants with no HepB dose at 3 months increased from 2.9% of infants born Q1 2024 to 6.4% of infants born in Q1 2025 [Figure 3].

Figure 1. Percent of eligible* Rhode Island newborns receiving Hepatitis B birth dose prior to discharge, 2019–Q2 2025



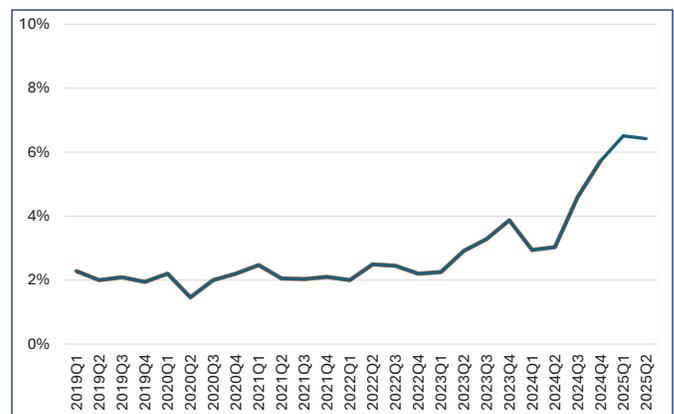
*Born in and discharged from a Rhode Island newborn nursery, birth weight >=2000 grams and mother not confirmed negative Hepatitis B

Figure 2. Hepatitis B vaccination status at age 3 months, among Rhode Island infants* who did not receive a birth dose prior to discharge from hospital, 2019–Q2 2025



*All infants born in and discharged from a Rhode Island newborn nursery

Figure 3. Percent of all Rhode Island infants* with no dose of Hepatitis B on record by 3 months, 2019–Q2 2025



*Discharged from a Rhode Island hospital

Table 1. Modeled future vaccination status of RI infants born Q1–Q2 2024 versus Q1–Q2 2025

	Combined 7 series complete by 24 months	Kindergarten requirements met
Compliance rates for previous birth cohort		
Birth dose in hospital	81.8%	91.1%
Well visit dose <3 mo.	65.4%	81.8%
No dose by 3 mo.	2.8%	10.1%
Overall completion rate	79.6%	89.1%
Projected overall completion rates for infants born Q1–Q2 2024	79.3%	88.8%
Projected overall completion rates for infants born Q1–Q2 2025	75.6%	85.3%

*For Combined 7 series: born July 2020–July 2023.
For Kindergarten requirements: born July 2017–January 2020

Among infants who received a HepB birth dose prior to discharge from the hospital, 81.8% completed the Combined 7 series by 24 months of age, compared to 65.4% of those who received an initial HepB dose at an early well visit [Table 1]. Among those who had no HepB dose on record, only 2.8% completed the Combined 7 series. Among those in an earlier birth cohort who received a HepB birth dose prior to hospital discharge, 91.1% completed all Kindergarten school immunization requirements compared to 81.8% of infants who received a HepB dose at a well visit and 10.1% of infants with no HepB dose on record by 3 months. Applying these rates to infants born in Q1–Q2 2024 and Q1–Q2 2025, all else remaining equal, overall Kindergarten immunization compliance can be anticipated to drop to 85.3% for infants born in the first half of 2025, from 88.8% for infants born in the first half of 2024.

DISCUSSION

The proportion of RI newborns receiving a Hepatitis B birth dose prior to discharge began falling in 2023, with the decline accelerating since late 2024. While about half of the infants without a birth dose do receive a first HepB dose at one of their first well visits, this still results in an increased proportion of infants with no HepB vaccine in their first 3 months. This vaccination status is further associated with completion of the Combined 7 series on target and with Kindergarten requirements compliance. These findings align with previous work showing that delayed receipt of an initial HepB is associated with reduced adherence to subsequent vaccinations, suggesting that the birth dose not only provides immediate protection against HBV but also establishes positive patterns of vaccine uptake.^{10–13} This study adds to the current literature by showing an abrupt acceleration

of decline starting in 2024 and by projecting the potential future impact on childhood immunization rates if current patterns hold in 2 and 5 years, respectively.

Despite RI's historically strong performance, the sharp recent decline of birth dose receipt is cause for concern. The timing aligns with previous findings that unlike pediatric/adolescent vaccination, the decline is driven not by the COVID-19 pandemic but by more recent developments.¹⁶ However, it is less clear whether the decline is due more to health systems issues (eg, overextended hospital staff), sociocultural developments, or some synergy between the two—and understanding underlying causes is critical to formulating ways that health systems and public health can together address a trend that threatens to undo one of RI's key public health triumphs.

Historically, good health care access was considered a key predictor of vaccine receipt, but traditional measures of healthcare access are unlikely to explain our findings. RI has a robust universal childhood immunization purchase program that includes the birthing hospitals. Moreover, previous publications have found that traditionally advantaged subpopulations (eg, parents with private vs. public insurance) are more likely to refuse a birth dose, though also more likely to agree to a subsequent well visit dose.^{17,18} In addition, providers may focus on traditionally less-advantaged populations stereotyped to be higher-risk, although 1/3 of HepB positive patients have no clear risk factors¹⁸ and about half don't know their HepB status.¹⁹ Studies have shown that health system interventions such as electronic health record prompts, and healthcare staff and community-based education campaigns do indeed result in improved birth dose rates.^{20–22} Starting in 2025, RIDOH's Office of Immunization is applying the CDC's Immunization Quality Improvement for Providers (IQIP) program to newborn nurseries for the first time. This will provide technical assistance to help enhance workflows, reduce missed immunization opportunities, and increase vaccination rates.

The more difficult work for us all may lie in understanding and engaging with the cultural, social, and informational factors that also shape parental decision-making. The decline in HepB birth dose coverage signals a broader challenge for sustaining vaccine confidence and adherence. Coordinated action across public health, prenatal, and pediatric care is essential to reverse this trend and strengthen early immunization practices.

Limitations

The data source for this study is a sophisticated and comprehensive integrated data system, but like any data system it is subject to limitations. It is possible that some doses were administered but not reported into RICAIR, although we did also include doses submitted by subsequent providers as reported history. Despite routine address checks, KIDSNET also may not know if a child appears to be unvaccinated

simply because s/he has moved out of RI. We also acknowledge the tenuousness of projected compliance rates based on the limited data available. However, we have provided those projections solely as an approximation of potential public health ramifications of recent trends.

CONCLUSIONS

The HepB birth dose plays a dual role: preventing perinatal HepB infection and establishing early adherence to the recommended vaccination schedule. While some providers may feel their patients are sufficiently low-risk to skip the birth dose, achieving universal coverage is not only essential for protecting infants from HepB but also represents a critical step toward broader vaccine confidence and progress toward HepB elimination goals.

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Disclosures

The authors report nothing to disclose.

Disclaimer: The views expressed herein are those of the authors and do not necessarily reflect the views of the Rhode Island Department of Health.

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