



Single-Dose Doxycycline for Lyme Disease Prophylaxis in Children in a Large United States Healthcare Database, 2016–2020



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BACKGROUND

- Lyme disease can be prevented by a single dose of doxycycline (SDD) as post-exposure prophylaxis (PEP) following a high-risk tick bite.
- Children aged 5–9 years who live in states with high Lyme disease incidence are typically one of the highest risk groups.
- Historically, clinicians avoided prescribing doxycycline for children aged <8 years but recent guidelines have indicated that short courses (<21 days) are safe for children of all ages.
- Patterns of Lyme disease PEP among children in the US are not well understood but may have implications for uptake of other prevention methods, including vaccination.

OBJECTIVE

To understand the epidemiology of Lyme disease PEP in children by describing the frequency and patterns of single-dose doxycycline dispensings among a cohort of pediatric patients.

METHODS

Study design: Retrospective cohort

Data source: Administrative claims data from five U.S. Data Partners contributing to the Sentinel Distributed Database from Jan 2016 to Dec 2020.

Study population and study period: Children aged 0–19 years with Medicaid or commercial insurance coverage who received ≥ 1 SDD (<200 mg) dispensing during Jan 2016–Dec 2020.

Statistical analysis:

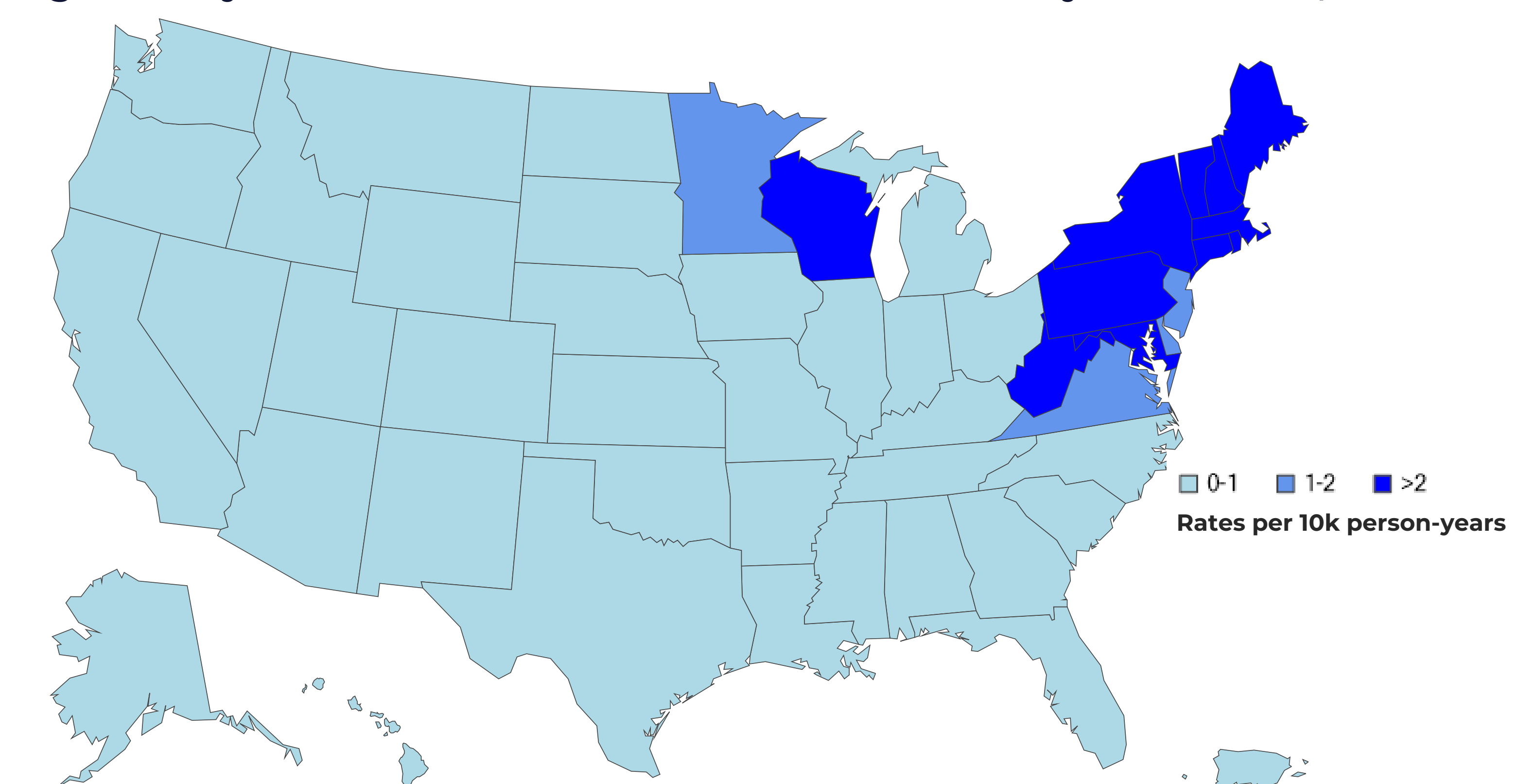
- We estimated the number of SDD dispensings among pediatric patients and calculated the rate per 10,000 eligible person-years (PY). We also described patient characteristics and geographic and seasonal patterns.
- Patients were eligible for inclusion if they met all cohort entry criteria on at least one day during the study period.
- We employed Poisson regression to compare rates and estimate unadjusted rate ratios (RR), and 95% confidence intervals (CI).

RESULTS

- Among the cohort of 72,347,267 eligible pediatric patients, 19,976 received ≥ 1 SDD dispensing; most (97%) received only one dispensing
- Overall SDD dispensing rate was 1.1 per 10,000 eligible PY
- Mean age of patients who received ≥ 1 SDD dispensing was 12.9 (SD: 4.5) years;
 - Most (86%) were for patients aged 8–19 years
 - SDD rates were higher in older than younger patients (**Figure 1**)
 - Ages 0–7: **0.38** / 10k eligible PY
 - Ages 8–19: **1.65** / 10k eligible PY
- SDD rates were higher in male than female patients
 - Male: **1.18** / 10k eligible PY
 - Female: **1.07** / 10k eligible PY
- Rates were higher among those with commercial insurance than with Medicaid coverage; unadjusted RR 2.31 (95% CI: 2.24, 2.37) (**Figure 1**)
 - Commercial: **2.05** / 10k eligible PY
 - Medicaid: **0.89** / 10k eligible PY

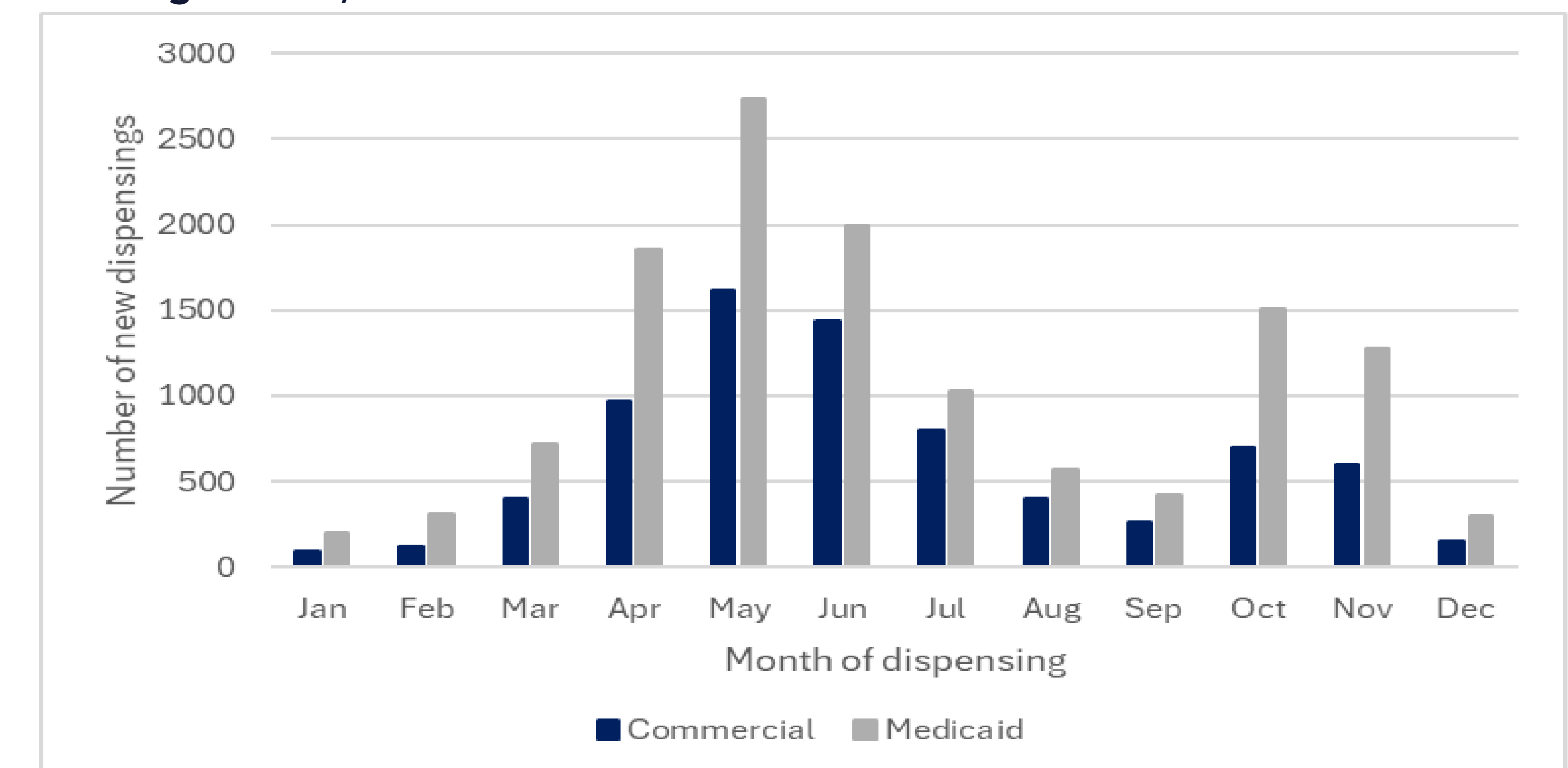
- The rate of SDD dispensing varied by geography; (**Figure 2**)
 - High incidence (10 Lyme disease cases per 100,000 population: CT, DE, MA, MD, ME, MN, NH, NJ, NY, PA, RI, VA, VT, WI): **3.68** / 10k eligible PY
 - Neighboring high incidence (DC, IA, IL, IN, KY, MI, NC, ND, OH, SD, TN, WV): **0.51** / 10k eligible PY
 - Low incidence (all other states): **0.22** / 10k eligible PY

Figure 2. Rates of incident single-dose doxycycline dispensings among children aged 0–19 years in the Sentinel Distributed Database by state — U.S., 2016–2020



- Most (80%) SDD dispensings were during the six summer and fall months when the blacklegged ticks are most active (April–July, October, November); (**Figure 3**)
- SDD rates varied by urbanicity (rural, suburban, or urban zip codes)
 - Rural: **3.47** / 10k eligible PY
 - Suburban: **1.40** / 10k eligible PY
 - Urban: **0.90** / 10k eligible PY

Figure 3. Number of incident single-dose doxycycline dispensings among children aged 0–19 years in the Sentinel Distributed Database by month and insurance coverage — U.S., 2016–2020



CONCLUSIONS

- Few children were dispensed SDD during the study period.
- SDD dispensing rates were highest among children living in rural areas in states with high Lyme disease incidence, suggesting that most dispensings may have been for Lyme disease PEP.
- Lower rates of SDD dispensing among younger children and children with Medicaid coverage highlight important gaps in Lyme disease prevention and suggest a need for targeted interventions and clinician education.

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- The contents are those of the authors and do not necessarily represent the official views of, nor an endorsement by, FDA, CDC, HHS, or the U.S. Government.
- Some authors are employees of HPHCI, a non-profit organization that conducts work for government and private organizations, including pharmaceutical companies.
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