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Addressing Climate Change-Induced Tick-borne Lyme Disease Patterns Through Data-Driven 'One Health' Policy

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Background

COMMENTARY

Addressing Climate Change-Induced Tick-borne Lyme Disease Patterns Through Data-Driven 'One Health' Policy

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- Climate change is altering the ecology of Borrelia-infected ticks, which changes human–tick interactions and Lyme disease transmission.
- Cases peak in the summer months (June-July) in the Northeast region, concentrating demand for testing and treatment resources during those months.
- Climate change effects can prolong duration of peak cases or human exposure to Borrelia-infected ticks.
- Phenomena impacts health system readiness to manage Lyme infection and infection-associated chronic illnesses (Lyme IACI).

Current Treatment

- Lyme disease is treated with oral antibiotics doxycycline (Monodox, Doryx, Vibramycin, Oracea), amoxicillin (Amoxil), and cefuroxime (Cetrin, Zinacef). Early signs of neurologic Lyme disease are treated with intravenous antibiotic ceftriaxone (Rocephin).
- Benzathine penicillin and macrolide antibiotics are given if frontline antibiotics are ineffective. Prophylactic antibiotics may be administered if certain criteria are met in the absence of Lyme disease symptoms.
- Up to a quarter of patients report Lyme disease symptoms several months past infection - there is no evidence of long-term antibiotics, or any other treatment, resolving poorly defined and understood phenomenon of chronic Lyme symptoms.
- **According to the NASEM Lyme disease study, among those infected with Lyme disease, an estimated 5-10% of individuals will experience persistent symptoms following the recommended antibiotic treatment, warranting long-term health system readiness to not only track but also treat cases.**

One Health: It's for All of Us

- **One Health** - a concept that expands the traditional cast of health care and public health stakeholders to include untapped expertise (veterinary, environmental, and agricultural sciences).
- A One Health approach, combined with **data modernization initiatives**, can be useful to **understand and predict climate change-induced tick-borne Lyme disease infection trends** within states and across regions.
- According to information online, the US states of **New Jersey, Pennsylvania, and Idaho** currently have state-level One Health task forces.

Data Modernization

- The New Jersey Department of Health's Communicable Disease Service (CDS) has a particularly robust "Communicable Disease Reporting and Surveillance System" and shares data with the CDC.
- CDS monitors several risk factors and trends for vector-borne diseases – integration of continuously collected public health and environmental data is unclear.
- **Augmenting or configuring an existing Lyme disease registry with reported real-time information from collaborating health systems may elucidate where a Lyme disease case was recorded and where a tick bite/exposure occurred.**
- **A modernized approach will promote immediate and long-term health system readiness (medicines supply chain, treatment acceleration, staffing, etc.).**

State-Level Outreach: New Jersey & Pennsylvania

- **New Jersey (Department of Agricultural):** A representative reported that "due to budget constraints, we have been unable to launch the One Health program." They intend to have the program running next year.
- **Pennsylvania (Department of Agriculture)**: Website features "The Pennsylvania One Health Task Force," but state contacts were not aware of ongoing efforts.
  - Pennsylvania officials directed us to a 2015 task force report and 2022 workgroup, which were part of a cross-agency Lyme disease task force to improve surveillance.
  - Task force was disbanded by a newly elected governor's Secretary of Health.
  - Ongoing, monthly workshops within PA Dept of Health to share knowledge on climate change impacts on health.

State-Level Outreach: Idaho

- Observed a 2015 ASTHO issue brief featured the state's desire to include One Health principles in public policy responses.
- No response received following an email to the Idaho Dept of Health and Wellness.

Next Steps

- **We will continue our state and regional level outreach to discuss our recommendations, garner feedback, and assess needs based on local readiness, engagement, and experiences.**
  - Municipalities, health systems, and agencies should be able to review linked, geographic data on where environmental conditions have been most ideal for a rise in tick populations/density (e.g., winter snowfall, humidity, temperature trends, recent tick population patterns, deer density, etc.) as well as data on human activity in different geographic areas (e.g., public park usage).
  - Altogether, this could help health systems better prepare and dedicate actionable and preventive resources and efforts in areas with an anticipatedly high rate of Lyme disease due to shifting climate patterns.

Thank You!

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