Lyme Disease Incidence in Wisconsin: A Comparison of State Reported Rates with Rates from a Population-Based Cohort

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Background

• Lyme disease is reportable in all states
• 88,967 cases reported to CDC (1992-1998) ---- 3,327 from Wisconsin
• Wisconsin mean annual incidence highest in north-central states and 7th highest nationally
Distribution of *Ixodes scapularis* by County, 1997
Reported Lyme Disease Incidence by County, 1992-1998

Incidence per 100,000

- Red: >=100
- Pink: 30-99
- Blue: 10-29
- Turquoise: <10

- White: <10
Specific Aims

• Assess completeness and accuracy of LD reporting in north-central Wisconsin

• Calculate and compare incidence rates and trends across age, gender, and time using state reported LD data and data from the Marshfield Epidemiologic Study Area (MESA)
Marshfield Clinic

- 600 physician multi-specialty group practice
- 350,000+ unique patients seen per year
- 1.6 million+ patient visits per year
- 40 regional centers in 32 communities
- All centers share a common electronic medical record
Marshfield Epidemiologic Study Area

- Dynamic, population-based cohort established in 1991 (n~78,000)
  - 14 ZIP codes surrounding main Marshfield Clinic campus
  - 10 ZIP codes surrounding northern regional centers
- Subset of geographic area served by Marshfield Clinic with high population and health event coverage
Marshfield Epidemiologic Study Area

MESA (n=77,280)

Marshfield Clinic Primary Service Area
CaseAscertainment

• Electronic diagnosis file (1992-1998)
  – ICD-9 codes: 088.81, 695.90, 066.90
  – Outpatient and inpatient visits
  – Excluded patients with diagnosis prior to 1992

• Laboratory database
  – Positive Lyme serology
  – IFA or EIA, with or without WB
Chart Review & Adjudication

• Probable LD (National case definition)
  – Physician-diagnosed EM \( \geq 5 \text{ cm in diameter} \)
  – At least one arthritic, neurologic, or cardiac manifestation with lab confirmation of infection

• Possible LD

• Not LD
Incidence Rates

- Numerator: probable LD cases in MESA
- Denominator: U.S. Census data
- Annual rates calculated
- Rates stratified by age, gender, stage of disease at diagnosis
- Rates also calculated with DPH reported LD data for entire state and 8-county region surrounding MESA
Assessment of Lyme Disease Passive Surveillance

- Patient identifiers sent to WI DPH
- Matched to reported cases based on name, date of birth, and date of diagnosis (+/-1 month)
Lyme Disease Incidence

![Graph showing the incidence of Lyme disease in males and females for the State of WI, 8 County Region, and MESA.](image-url)
Lyme Disease Incidence

Incidence per 100,000

- 0-20 yr
- 21-44 yr
- 45-64 yr
- 65+ yr

State of WI  8 County Region  MESA
Lyme Disease Reporting

Probable LD (n=102) - 34.3%
Possible LD (n=87) - 19.5%
Non-Cases (n=342) - 6.7%
Summary of Findings

• Mean annual LD incidence 1992-1998
  – MESA: 19.1 per 100,000 per year
  – 8-county region: 17.0
  – Statewide: 9.0

• Rise in incidence 1996-1998

• Males and individuals 45-64 yr of age had highest LD rates
Limitations

• Capture of patient encounters not 100% in MESA

• 8-county region vs. MESA
  – Population ~300,000 vs. ~78,000
  – Non-Marshfield Clinic providers included in 8-County region
  – ZIP code information not available in state reports during study period
Conclusions

• Only 1/3 of cases reported to state health department, but this is higher than reported in other studies

• State LD surveillance system is monitoring trends in LD incidence across time, gender, and age reasonably well -- despite underreporting