(Human) surveillance of tick-borne diseases in Belgium

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Epidemiology of infectious diseases
ASCID symposium, 14 November 2017
Surveillance pyramid for VBD

Braks et al. Parasites & Vectors 2011, 4:192
TICKS
Number of people consulting a GP for a tick bite

Annual incidence of consultation rate (and 95% CI) for tick bite per 10 000 persons, sentinel network of GPs

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<tbody>
<tr>
<td>Consultation for tick bite</td>
<td>18.6 (17.2-20.0)</td>
<td>18.6 (17.3-20.1)</td>
<td>17.6 (16.1-19.2)</td>
</tr>
</tbody>
</table>

→ Estimated 18 000 to 21 000 consultations for tick bite / year
TekenNet/TiquesNet

- Launch website June 2015 and app in May 2016

[Image of map and graph showing tick bite data]

[Image of webpage with a map and data]

tekennet.wiv-isp.be
Prevalence pathogens in ticks

- Collection of ticks on humans from April – October 2017, through TekenNet
- Multiplex PCR (RIVM) for different pathogens (*B. burgdorferi* s.l., *Anaplasma* spp., *Rickettsia* spp., *C. Neoehrlichia mikurensis*, *B. miyamotoi* and *Babesia* spp.)
- > 3000 ticks collected, 1000-1500 will be tested
LYME BORRELIOSIS
Surveillance pyramid for Lyme

- Infected wildlife
- Infected ticks
- Population exposed
- Tick bites
- Erythema migrans
- Disseminated Lyme
- Hospitalized
- Hospital records
- Lab network
- GP network
- Seroprevalence
- TekenNet/GP
- Study

Adapted from Braks et al. Parasites & Vectors 2011, 4:192
Ticks

- Localized studies report prevalence of infection in (questing) ticks/nymphs between 2.8 and 37 %
- National study ongoing

References:
Jansen L. ITG. Stagerapport 2016 – Deblauwe et al. Poster presented at AZG.
Ruyts et al. Parasitology. 2016 Sep;143(10):1310-9
Seroprevalence study 2016

- Residual samples (n=3 215) representative of the Belgian population, collected in 2013-2014 by 27 labs

- *Borrelia burgdorferi* s.l. IgG antibody reactivity by Elisa (Liaison XL) followed by confirmation test (Western Blot) at NRC Lyme (UCL)

- Adjusted* overall seroprevalence of 1.06% (95% CI: 0.67-1.67)

- Estimations on healthy individuals/blood donors in Europe range between 1.6% (Slovakia) and 9.5% (Germany)

* Clustered sampling and standardization for age, gender and province
Network of laboratories

Number of positive serological results by week, sentinel network of laboratories, 2000-2016

[Bar chart showing the number of cases from 2000 to 2016, categorized by region (Brussels, Flanders, Wallonia).]
Minimal hospital data

Annual number of hospitalisations for Lyme disease (primary diagnosis), 2005-2014, MZG-RHM
Prospective cohort study (6 to 24 months) on cost/burden of LB and occurrence of PTLDS

<table>
<thead>
<tr>
<th></th>
<th>Cohort 1: Erythema Migrans (EM)</th>
<th>Cohort 2: Disseminated Lyme</th>
<th>Control group: No Lyme</th>
<th>Goup 3: Other TB infection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inclusion criteria</strong></td>
<td><a href="https://www.cdc.gov/ticks/images/ticks-on-top-of-skin-04.jpg">Erythema Migrans</a></td>
<td>Arthritis, Neuroborreliosis Other*</td>
<td>Age &amp; gender matched, no prior Lyme</td>
<td>Fever &lt;1 month after tick bite</td>
</tr>
<tr>
<td><strong>Recruitment</strong></td>
<td>GPs</td>
<td>Hospitals</td>
<td>Patients</td>
<td>GPs</td>
</tr>
<tr>
<td><strong>Follow-up</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Blood sample</strong></td>
<td>Yes</td>
<td>/</td>
<td>/</td>
<td>Yes</td>
</tr>
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</table>

Partners: UCL, NRC Lyme (UCL – UZ Leuven), CHERMID, RIVM
OTHER TICK-BORNE DISEASES
Anaplasmosis

Animal hosts and ticks:

- 19.5% *Ixodes* ticks on 1135 cats and dogs carry *A. phagocytophilum* (2008-2009)
- 22% feeding / 3% questing *Ixodes* ticks (2010)
- 1.2% questing *Ixodes* ticks (2015)
- PCR+ spleen of 1% wild boar in Wallonia (2011)

Nahayo et al. BMC Vet Res. 2014 Apr 2;10:80
Human

Surveillance by NRC (Military Hospital Queen Astrid)

Annual number of reported (old or recent) infections with *A. phagocytophilum*, Belgium, 2005-2016

Seroprevalence*: 8.1% in professionals at risk (n=148), 6.2%/ 5.7% in rural (n=209)/urban (n=193) blood donors. Cross reactivity?

Tick-borne encephalitis

Animal surveillance

- **Dogs**, 2009, Belgium (n=880): 1 sero+ in West-Vlaanderen
- **Cattle**, 2010, Belgium (n=650): 17 sero+ and 6 borderline
- **Wild boar**, 2013, Limburg/Antwerpen and West-Vlaanderen (n=238): 7 sero+ and 3 borderline
Human

- Surveillance by NRC (ITG) + WIV
- Number of patients tested increased from 44 in 2012 to 127 in 2016
- So far, only imported cases diagnosed

<table>
<thead>
<tr>
<th>Year</th>
<th>Age</th>
<th>Sex</th>
<th>Clinical presentation</th>
<th>Vaccination status</th>
<th>Origin of infection</th>
<th>Country of importation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>44</td>
<td>M</td>
<td>Influenza-like syndrome</td>
<td>Not vaccinated</td>
<td>Imported</td>
<td>Austria</td>
</tr>
<tr>
<td>2013</td>
<td>67</td>
<td>M</td>
<td>Unspecified neurological symptoms</td>
<td>Unknown</td>
<td>Imported</td>
<td>Kyrgyzstan</td>
</tr>
<tr>
<td>2014</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2015</td>
<td>22</td>
<td>M</td>
<td>Meningoencephalitis</td>
<td>Not vaccinated</td>
<td>Imported</td>
<td>Slovenia</td>
</tr>
<tr>
<td>2016</td>
<td>44</td>
<td>F</td>
<td>Unspecified neurological symptoms</td>
<td>Not vaccinated</td>
<td>Imported</td>
<td>Unspecified</td>
</tr>
</tbody>
</table>
Tularaemia

- Surveillance: Ref Lab (CODA-CERVA) + mandatory notification
- 1950-2011: 3 cases, increase since 2012
- Almost all cases diagnosed by 1 hospital
- Source infection 2012-2016: tick bite 50%
- Seroprevalence study*:
  - Professionally exposed Wallonia: 2.7%
  - Blood donors Mont Godinne: 0.5%
  - Blood donors Woluwe: 2.1%

Rickettsioses

Human

- Mandatory notification (not Brussels) + surveillance by NRC (ITG)
- ~ 20-25 cases per year
- All confirmed recent infections in Belgium are imported (South-Africa, Morocco)
- Species identified in 2016 (n=7): *R. africae* (n=6), *R. conorii* (1)

Ticks

- 14% *Ixodes* ticks infected with *R. helvetica*

Other diseases

- Relapsing fever (*Borrelia Miyamotoi*): 1.1 -1.6% in questing ticks
- Babesiosis: antibodies detected against *B. microti*, *B. divergens*, and *Babesia* spp. EU1 in humans / 1.3% in feeding ticks cats/dogs
- *Candidatus Neoehrlichia mikurensis*: 0.4% in questing ticks
  → Study in humans (fever within one month after tick bite): screening for *N. mikurensis*, *A. phagocytophilia*, *B. miyamotoi*, *Rickettsia* spp., *Babesia* spp. (HUMTICK)

Lempereur et al. Clin Microbiol Infect. 2015 Jan;21(1):96.e1-7
Summary

- **Ticks**: TekenNet/study
- Human surveillance: mainly focus on *Lyme borreliosis*; so far no indication of a marked increase
- **Other diseases**:
  - Surveillance based on NRC/ref labs and mandatory notification
  - Rare or only imported cases (so far…)
  - Study ongoing
Acknowledgements

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To Avia-Gis