Listeriosis in Europe: how to interpret surveillance data?

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What are the keys to interpret listeriosis surveillance data

- Objectives of the surveillance
- Source of notification of the cases
- Case-definition
- Geographical coverage
- Sensitivity of the surveillance
- Type of data collected
- Timeliness of data transmission and analysis
Feasibility study for a collaborative surveillance of Listeria infections in Europe

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Institut Pasteur, Paris
DG Sanco
Objectives of the feasibility study for a collaborative surveillance of Listeria infections in Europe

• to make an inventory of
  • existing surveillance systems of Listeriosis in Europe
  • reference laboratories and their practices and methods

• to define the scope and feasibility of a European surveillance network

• to make recommendations on operating procedures
Countries participating in the inventory of *Listeria* surveillance systems, Western Europe, 2002

Participation

17 countries
Objectifs of surveillance of listeriosis in European countries, 2001

- Monitor trends: 16 countries
- Improve epidemiological knowledge: 16 countries
- Detect outbreaks: 13 countries
- Target food safety interventions: 12 countries
Countries by data source for surveillance of listeriosis

- 10 Statutory Notification
- 4 Universal Voluntary Reporting
- 4 Syndrome based surveillance
- 2 Sentinel Surveillance
- 16 National Reference Laboratory
Listeriosis surveillance, notifying partners in European countries, 2002

Switzerland
Greece
Germany
Scotland

Austria
Belgium
Denmark
England & Wales
Finland
France
Iceland
Netherlands
Norway
Spain
Sweden

Italy

Laboratories
Physicians
Surveillance case definitions for listeriosis in European countries, 2001

- All based on laboratory confirmation
  - isolation of *Listeria monocytogenes*
  - serology also considered (Norway, Ireland)

- Site of isolation
  - any site (8)
  - from a normally sterile site (7)
  - from foetal or placental tissue or surface swabs from an ill new-born (2+1)
  - symptoms compatible with listeriosis (2)

- Epidemiological link with confirmed case (1)
Listeriosis surveillance, centralisation of data

Statutory notification and voluntary reporting
- national level: 13 countries
- regional level: 1 country (Belgium)
- partly national: 1 country (Spain)

Syndrom based, sentinel surveillance
- national level: 5 countries
Geographical coverage of Listeriosis surveillance systems in European countries, 2001

- Few formal evaluations

- Geographical coverage: whole country except
  - Spain (about 50% of the autonomous communities)
Sensitivity of Listeriosis surveillance systems in European countries, 2001

- **France:**
  - statutory notification + reference laboratory: 87% (2000)

- **The Netherlands:**
  - Sentinel surveillance: 35%

- **Assumed to be high:**
  - Denmark, Netherlands CNS infections, England & Wales

- **Most countries:**
  - sensitivity of statutory notification or voluntary reporting higher than reference laboratory
<table>
<thead>
<tr>
<th>Country</th>
<th>Number of cases reported</th>
<th>Number of strains received by NRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden, 2001</td>
<td>67</td>
<td>12</td>
</tr>
<tr>
<td>Switzerland, 2000</td>
<td>54</td>
<td>46</td>
</tr>
<tr>
<td>England &amp; Wales</td>
<td></td>
<td>80%*</td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td>75%*</td>
</tr>
<tr>
<td>Finland, 2000</td>
<td>18</td>
<td>25</td>
</tr>
</tbody>
</table>

* % of reported cases
### Type of data collected by listeriosis surveillance systems in European countries, 2001, 14 countries

<table>
<thead>
<tr>
<th>Type of data</th>
<th>No of countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting institute</td>
<td>14</td>
</tr>
<tr>
<td>Demographics (age, sexe)</td>
<td>14</td>
</tr>
<tr>
<td>Place of residence</td>
<td>14</td>
</tr>
<tr>
<td>Date of Lm isolation</td>
<td>14</td>
</tr>
<tr>
<td>Type of investigated material</td>
<td>14</td>
</tr>
<tr>
<td>Clinical presentation</td>
<td>9</td>
</tr>
<tr>
<td>Pregnancy associated</td>
<td>6</td>
</tr>
<tr>
<td>Underlying medical condition</td>
<td>4</td>
</tr>
<tr>
<td>Outcome</td>
<td>5</td>
</tr>
<tr>
<td>Travel history</td>
<td>6</td>
</tr>
<tr>
<td>Suspected source of infection</td>
<td>5</td>
</tr>
<tr>
<td>Food history</td>
<td>1+5</td>
</tr>
<tr>
<td>Link to other cases</td>
<td>5</td>
</tr>
</tbody>
</table>
Listeria surveillance, frequency of reporting to national level

Statutory notification or voluntary reporting:
- continuously: 10 countries
- weekly: 2 countries
- monthly: 1 country

Syndrome based surveillance:
- continuously: 3 country
- monthly/quarterly: 1 country

Sentinel surveillance
- weekly: 2 country
Listeria surveillance, frequency of data analysis at national level

statutory notification or voluntary reporting:
- continuously 3 countries
- weekly 4 countries
- monthly 1 country
- quarterly 2 countries
- yearly 2 countries

Syndrome based surveillance:
- weekly 1 country
- yearly 3 countries

Sentinel surveillance
- weekly 1 country
- irregular 1 country
Observed incidence of listeriosis in European countries, 2000-2001

- Range: 0.3 - 7.5 cases per million
- Reflects:
  - incidence
  - sensitivity of surveillance system
<table>
<thead>
<tr>
<th>Country</th>
<th>System</th>
<th>Observed cases</th>
<th>Observed Incidence (*1,000,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Refer.Lab</td>
<td>14</td>
<td>1,7</td>
</tr>
<tr>
<td>Belgium (Fl)</td>
<td>Stat.Notif.</td>
<td>26</td>
<td>4,4</td>
</tr>
<tr>
<td>Belgium</td>
<td>Sent+Ref.Lab</td>
<td>48</td>
<td>4,7</td>
</tr>
<tr>
<td>Denmark</td>
<td>Stat. Notif</td>
<td>38</td>
<td>7,2</td>
</tr>
<tr>
<td>England and Wales</td>
<td>Univ.Vol.Rep</td>
<td>135</td>
<td>2,5</td>
</tr>
<tr>
<td>Finland</td>
<td>Stat.Notif.</td>
<td>29</td>
<td>5,6</td>
</tr>
<tr>
<td>Germany</td>
<td>Stat.Notif.</td>
<td>220</td>
<td>2,7</td>
</tr>
<tr>
<td>Greece</td>
<td>Univ. Vol. Rep</td>
<td>3</td>
<td>0,3</td>
</tr>
<tr>
<td>Iceland</td>
<td>Stat.Notif.+NRL</td>
<td>0</td>
<td>0,0</td>
</tr>
<tr>
<td>Ireland</td>
<td>Univ. Vol. Rep</td>
<td>6</td>
<td>1,6</td>
</tr>
<tr>
<td>Italy</td>
<td>Stat. Notif.</td>
<td>36</td>
<td>0,6</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Sentinel</td>
<td>19</td>
<td>1,2</td>
</tr>
<tr>
<td>Norway</td>
<td>Stat. Notif.</td>
<td>17</td>
<td>3,8</td>
</tr>
<tr>
<td>Portugal</td>
<td>Ad hoc studies</td>
<td></td>
<td>0,0</td>
</tr>
<tr>
<td>Scotland</td>
<td>Univ. Vol. Rep</td>
<td>15</td>
<td>2,9</td>
</tr>
<tr>
<td>Spain</td>
<td>Refer.Lab</td>
<td>60</td>
<td>1,5</td>
</tr>
<tr>
<td>Sweden</td>
<td>Stat. Notif.</td>
<td>67</td>
<td>7,5</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Stat.Notif.</td>
<td>54</td>
<td>7,4</td>
</tr>
</tbody>
</table>

The observed incidence reflects:

- real incidence
- Sensitivity of surveillance system

Data cannot be compared between countries without taking into account the differences in sensitivity of the surveillance systems.
Listeriosis surveillance in Europe: is outbreak detection possible?

Outbreak detection relies on discriminant typing of strains.
Main objective of E.U. surveillance

- OUTBREAK DETECTION & CONTROL
  - Good geographical coverage
  - Type of data collected: serotype/PFGE
  - Time interval for data transmission & analysis: weekly

- Long term trends

- Improvement of surveillance
National Reference laboratories for *Listeria*, Western Europe, 2002

16 countries
Microbiology questionnaire (Listernet)

N R L functions

- Surveillance 16
- Outbreak detection 14
- Training 9
- Providing expertise 13
- Distribution (sera, strains) 8
- Research 11
Acceptability of systematic real-time PFGE using a common standardized protocol

- **6 countries** already or will start in 2003/04
- **7 countries** willing to set up routine weekly PFGE typing or to send isolates for typing
- **13 countries** willing to use a common protocol and send isolates or profiles to a common data base
Participants

- **Scandinavia**: Denmark (H+F), Finland (H+F), Norway (H+F+F), Sweden (F+F)

- **Mediterranée**: France (H+F), Greece (H), Israël (H), Italy (H), Spain (H+F)

- **Center Europe**: Austria (F), Belgium (H+F), Germany (H+H), Ireland (H+F)
Strains selected: PFGE with Ascl

- CLIP90582-France-1Ascl
- CLIP90602-France-1Ascl
- CLIP90764-France-1Ascl
- CLIP88868-France-1Ascl
- CLIP89754-France1Ascl
- CLIP89756-France1Ascl
- CLIP89380-France-1Ascl
- CLIP89381-France-1Ascl
Strains selected: PFGE with Apal

PFGE-Apa1(Lm)  PFGE-Apa1(Lm)

CLIP88868-France1
CLIP90764-France1
CLIP90582-France1
Clip90602-France1
CLIP89754-France1
CLIP89756-France1
CLIP89380-France1
CLIP89381-France1
Each gels’ photography was analysed

- Visually

- Using Bionumerics© software, when possible
VISUAL COMPARISON: criteria to validate a gel

- Standard profile as expected
- Position of standard lanes (at least 2, no more than 7-8 lanes in-between)
- Bands definition (contrast, saturated, smear, fuzzy or blurred)
- Quantity of DNA (sufficient)
- Partial digestion
- Diverse (very large spots, very white photography...)

[Image of European Union flag]
Computerized image analysis

- **Settings** were those of Pulse Net America

- **Comparison settings** were:
  - Optimization 0.50 to 1.50 %
  - Band comparison: Position tolerance 1.00 % (1.50%)
  - Ignore uncertain bands

- Dice

- UPGMA
Similar pattern (Ascl)

PFGE-Asc1(Lm)

CLIP90582-France-1Ascl
CLIP90602-France-1Ascl
CLIP90764-France-1Ascl
CLIP88868-France-1Ascl
CLIP89754-France1Ascl
CLIP89756-France1Ascl
CLIP89380-France-1Ascl
CLIP89381-France-1Ascl

PFGE-Asc1(Lm)

CLIP90582.
CLIP90602.
CLIP88868.
CLIP90764.
CLIP89754.
CLIP89756.
CLIP89380.
CLIP89381.
Similar pattern (ApaI)
### Computerized image analysis (S. Braenderup H9812)

<table>
<thead>
<tr>
<th>Gel</th>
<th>Ref Gel Ascl</th>
<th>Ref Gel Apal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gel 1</td>
<td>Partially similar</td>
<td></td>
</tr>
<tr>
<td>Gel 2</td>
<td></td>
<td>Similar</td>
</tr>
<tr>
<td>Gel 5</td>
<td>Similar</td>
<td></td>
</tr>
<tr>
<td>Gel 6</td>
<td></td>
<td>Different</td>
</tr>
<tr>
<td>Gel 7</td>
<td>Partially similar</td>
<td></td>
</tr>
<tr>
<td>Gel 8</td>
<td></td>
<td>Similar</td>
</tr>
<tr>
<td>Gel 9</td>
<td>Partially similar</td>
<td></td>
</tr>
<tr>
<td>Gel 11</td>
<td>Similar</td>
<td></td>
</tr>
<tr>
<td>Gel 12</td>
<td></td>
<td>Similar</td>
</tr>
<tr>
<td>Gel 13</td>
<td>Partially similar</td>
<td></td>
</tr>
</tbody>
</table>
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