Epidemiology of TB in Ireland

National Tuberculosis Conference
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Dr Joan O'Donnell
Outline of Presentation

● Surveillance

● Epidemiology

● Current challenges
  - Migration patterns
  - MDR-TB and XDR-TB
  - TB associated with HIV infection

● Ireland: Towards global elimination

● Conclusions
Surveillance (1)

- TB is statutorily notifiable by both clinicians and laboratories since 2003
- It is also mandatory to report outbreaks of TB
- Enhanced data on TB collected since 1998
- Incorporated onto CIDR from January 2011
- EU case definition will be applied (P. 6, National TB Guidelines)
- Latent TB infection is not statutorily notifiable
Surveillance (2)

Data:
Case based, disaggregate and anonymised

Variables:
Demographics including occupation, place of residence and country of birth, asylum seeker status, clinical (site of disease radiological), risk factors, previous history of TB and BCG, microbiology (smear, culture, histology, DST results and PCR), outcome data.

Outputs:
Quarterly and Annual Reports
Annual data to ECDC and WHO
Epidemiology

- Marked decline in the number of cases since 1950s
- Lowest rate in 2001 (9.7/100,000)

HOWEVER  Decline not Sustained

- More recent rates:
  - 2007: 11.3/100,000 (480 cases)
  - 2008: 11.0/100,000 (468 cases)
  - 2009: 11.1/100,000 (472 cases) (Provisional)
  - 2010: 10.1/100,000 (427 cases) (Provisional)

- Inner city pockets of high incidence (2008)
  - HSE-East
    - Dublin South City: 29.8/100,000
    - Dublin West: 28.4/100,000
    - Dublin North Central: 24.5/100,000
  - HSE-South (North Lee): 22.1/100,000
National TB notifications, rate & 3 year moving average 1991-2010*

*2009 & 2010 provisional data only
Estimated TB incidence rates, by country, 2009

Source: WHO
Map 1: Total TB notification rates per 100,000 population, Europe, 2009

- ≤ 10
- 11–20
- 21–50
- 51–100
- 101–150
- > 150
- Not included or not reporting

* Data from Kosovo (in accordance with Security Council Resolution 1244 (1999)) is not included in the figures reported for Serbia

Source: ECDC
**Table 1: Summary of the epidemiology of TB in Ireland, 2008**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number (% of total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of cases</td>
<td>468</td>
</tr>
<tr>
<td>Crude notification rate per 100,000</td>
<td>11.0</td>
</tr>
<tr>
<td>Cases in indigenous population</td>
<td>263 (56.2%)</td>
</tr>
<tr>
<td>Rate in indigenous population per 100,000</td>
<td>7.4</td>
</tr>
<tr>
<td>Cases in foreign-born persons</td>
<td>204 (43.6%)</td>
</tr>
<tr>
<td>Rate in foreign-born persons per 100,000</td>
<td>33.3</td>
</tr>
<tr>
<td>Culture positive cases</td>
<td>312 (66.7%)</td>
</tr>
<tr>
<td>Pulmonary cases</td>
<td>336 (71.8%)</td>
</tr>
<tr>
<td>Of which sputum smear positive</td>
<td>158 (47.0%)</td>
</tr>
<tr>
<td>Resistant cases</td>
<td>27 (5.8%)</td>
</tr>
<tr>
<td>Multi-drug resistant cases</td>
<td>2 (0.4%)</td>
</tr>
<tr>
<td>Deaths attributable to TB</td>
<td>9 (1.9%)</td>
</tr>
<tr>
<td>Outcomes reported in all cases</td>
<td>414 (88.5%)</td>
</tr>
<tr>
<td>Outcomes reported in sputum smear positive cases</td>
<td>144 (91.0%)</td>
</tr>
<tr>
<td>TB meningitis cases</td>
<td>6 (1.3%)</td>
</tr>
</tbody>
</table>

* Country of birth unavailable for 1 case
Bacteriological results 2008

In 2008:

- **312 (66.7%)** of all cases were culture positive
- Species were reported in **306 (98.1%)** culture confirmed cases:
  - *Mycobacterium tuberculosis* 294 (96.1%)
  - *Mycobacterium bovis* 12 (3.9%)
  - *Mycobacterium africanum* 0 (0.0%)

Pulmonary Cases:

- **158 (47.0%)** were positive for at least one AFB microscopy
- **244 (72.6%)** were culture positive
EU monitoring framework: Target = ≥ 80% culture confirmation among new pulmonary TB cases.

In 2009, 58% of all TB cases were culture confirmed, however the level differed widely across countries (range: 44.0%-100.0%). Only 7 countries reached the target.

Figure 3: Percentage of culture confirmation among all reported TB cases, 2009

* Luxembourg reported only culture-confirmed cases
# Treatment outcome data 2008

Outcomes reported for 414 (88.5%) of all 468 cases and in 91.1% of Sputum smear positive cases

<table>
<thead>
<tr>
<th>Treatment outcome</th>
<th>Total cases</th>
<th></th>
<th>Smear positive cases</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>Completed</td>
<td>338</td>
<td>72.2</td>
<td>120</td>
<td>75.9</td>
</tr>
<tr>
<td>Lost to follow up</td>
<td>30</td>
<td>6.4</td>
<td>11</td>
<td>7.0</td>
</tr>
<tr>
<td>Died (not attributed to TB)</td>
<td>25</td>
<td>5.3</td>
<td>6</td>
<td>3.8</td>
</tr>
<tr>
<td>Interrupted (&gt;2mths)</td>
<td>9</td>
<td>1.9</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Died (attributed to TB)</td>
<td>9</td>
<td>1.9</td>
<td>3</td>
<td>1.9</td>
</tr>
<tr>
<td>Died (cause unknown)</td>
<td>2</td>
<td>0.4</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Still on treatment</td>
<td>1</td>
<td>0.2</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Unknown</td>
<td>54</td>
<td>11.5</td>
<td>14</td>
<td>8.9</td>
</tr>
<tr>
<td>Total</td>
<td>468</td>
<td>100</td>
<td>158</td>
<td>100</td>
</tr>
</tbody>
</table>
Treatment Outcomes 2000-2008

The graph shows the number of notifications over the years from 2000 to 2008. The lines represent different outcomes:
- Blue: Completed
- Green: Died
- Purple: Interrupted (>2mths)
- Cyan: Still on treatment
- Orange: Lost to follow up
- Red: Unknown
Stop TB Partnership Targets

- **By 2005:** At least 70% of new sputum smear positive TB cases will be detected and at least 85% of these cases cured

- **In Europe (2008):** Six countries (Bulgaria, Malta, The Netherlands, Portugal, Slovakia & Sweden) successfully treated 85% or more of all new culture-confirmed pulmonary TB cases. This is three more countries than in 2007.
In 2009, six countries met the treatment success rate goal of 85%.

Complete and successful TB treatment contributes at reducing disease transmission and preventing emergence of resistant strains.

Figure 6: Treatment success rate among new laboratory-confirmed pulmonary TB cases diagnosed in 2008, EU/EEA
Current Challenges

- Migration Patterns
- MDR-TB/XDR-TB
- TB cases associated with HIV infection
Migration Patterns

- Proportion of immigrant cases has more than doubled since 2001
  - 2001: 17.0% of cases
  - 2008: 43.6% of cases
  - 2009: 40.5% of cases (Provisional)
  - 2010: 39.6% of cases (Provisional)

- In 2008:
  - The majority of foreign-born cases were from Asia (52.0%) & Africa (27.5%) with 17.2% from Europe

- In 2008:
  - The rate in the indigenous population was 7.4/100,000
  - The rate in foreign born population was 33.3/100,000
TB rates per 100,000 population by geographic origin, 1998 to 2010*
TB cases and rates by age group and geographic origin: 2008
<table>
<thead>
<tr>
<th>HSE Area</th>
<th>Irish-born</th>
<th>Foreign-born</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>%</td>
<td>Rate</td>
<td>Cases</td>
</tr>
<tr>
<td>HSE-E</td>
<td>121</td>
<td>51.1</td>
<td>9.8</td>
<td>116</td>
</tr>
<tr>
<td>HSE-M</td>
<td>7</td>
<td>29.2</td>
<td>3.2</td>
<td>17</td>
</tr>
<tr>
<td>HSE-MW</td>
<td>14</td>
<td>53.8</td>
<td>4.5</td>
<td>12</td>
</tr>
<tr>
<td>HSE-NE</td>
<td>10</td>
<td>55.6</td>
<td>3.0</td>
<td>8</td>
</tr>
<tr>
<td>HSE-NW</td>
<td>10</td>
<td>71.4</td>
<td>5.2</td>
<td>4</td>
</tr>
<tr>
<td>HSE-S</td>
<td>64</td>
<td>73.6</td>
<td>12.1</td>
<td>23</td>
</tr>
<tr>
<td>HSE-SE</td>
<td>18</td>
<td>60.0</td>
<td>4.5</td>
<td>12</td>
</tr>
<tr>
<td>HSE-W</td>
<td>19</td>
<td>61.3</td>
<td>5.5</td>
<td>12</td>
</tr>
<tr>
<td>Ireland</td>
<td>263</td>
<td>56.3</td>
<td>7.4</td>
<td>204</td>
</tr>
</tbody>
</table>
Proportion of TB notifications of foreign origin in Europe: 2009

Source: ECDC
Drug Resistant Cases

- The proportion of drug resistant cases is still low

- In 2008:
  - 3.4% (16) of total cases were resistant to isoniazid
  - MDR-TB: 0.4% (2 cases) of total cases
  - No XDR-TB case notified
  - No MDR-TB or XDR-TB cases notified in 2009
  - 2 MDR-TB cases notified in 2010 (Provisional)

- An increasing challenge due to globalisation

- In 2009, 28 EU countries:
  - Overall proportion of MDR-TB cases: 5.3%
  - Baltic States: MDR (17.4%-28.0%)
  - Romania: 11%
  - MDR TB among previously untreated cases: 2.8% ranging from 0-22% (Highest in Baltic states: 10-22%)
MDR TB cases - 2002 to 2010*

21 cases of MDR-TB
1 case of XDR-TB (2005)

Previous History of TB
• 6 cases (28.6%)

Place of birth
• 15 (71%) foreign born
• 6 (29%) Irish
Proportion of TB cases with isoniazid resistance and multidrug resistance, 2002 to 2010*
Percentage of notified TB cases with primary multidrug resistance, EU/EEA, 2009

Source: ECDC

Data from Kosovo (in accordance with Security Council Resolution 1244 (1999)) is not included in the figures reported for Serbia.
TB/HIV cases

- Data on HIV status of TB cases is incomplete and an underestimate
- HIV/AIDS: to become statutorily notifiable (2011)
  - Unable to link TB and HIV cases at present
- New guidance recommends improving this surveillance
- Inclusion of TB data on CIDR will make it easier to identify TB/HIV cases—more accurate estimate
HIV co-infected cases 2000-2009*
Estimated HIV prevalence (%) among people newly infected with TB, 2009

Source: WHO
TB Elimination

Elimination of TB

- Move towards elimination as proposed by WHO STOP TB strategy
  - (< 1 case per million population)
  - 4 cases of TB annually by 2050 (Irish context)

- Global TB control is required to achieve TB elimination in countries with low incidence
  - Borgdorff MW et al. Emerging Infectious Diseases Vol 11 (No. 4) April 2005
Towards Elimination

- **Many EU countries**: low TB notification rate at < 20/100,000 cases.
  - Need to consolidate efforts to move towards the elimination goal

- **Countries considered to be at the elimination phase if the case notification rate < 20/100,000 and the case notification rate has been decreasing over the previous five years**
Trends in:

1. **Case notification rate**
   
   A mean declining trend in the case notification rate over the previous five years allowing for random variation in the context where case finding efforts remained constant or increased

2. **MDR-TB case notification rate**
   
   A mean declining trend in MDR-TB case notification rate over the previous five years allowing for random variation in the context where case finding efforts remained constant or increased
TB Case Notification Rate

Year

Number of cases

3 year moving average

Crude Rate per 100,000 population
3. Ratio of notification rates in children to adults

A mean declining trend in the ratio of the notification rate in children to that in adults over the previous ten years allowing for annual random variation

4. The mean age of TB cases

An increasing trend in the mean age of TB cases over the previous 10 years
Trend in the ratio of notification rates in children and adults in the previous 10 years
Trend in Mean Age of TB cases in the previous 10 years
TB diagnosis in children: a continuing challenge

A decline or stabilisation of trends was recorded in high- and intermediate-incidence countries** (13 to 20 per 100 000 child population). Low-incidence countries* have recorded an increase in rates in all paediatric age groups.

**Figure 2: Notification rates of childhood TB in low-incidence and high/ intermediate-incidence countries in the EU/ EEA, 2000–2009**

* Defined as incidence < 20 per 100 000
** Defined as incidence > 20 per 100 000
Conclusions (1)

- TB notification rates dropped at the beginning of the decade, however, not sustained
- Regional variation with urban pockets with higher notification rates similar to other EU countries
- Increasing number of foreign born cases with lower rates in indigenous population
- Mean age of foreign born cases younger than indigenous cases
- Most frequently reported risk factors were
  - Alcohol misuse
  - Born in country of high TB endemicity
  - Being a contact of an active case
  - Immunosuppressive illness
Conclusions (2)

- Ratio of notification rates in adults and children increasing slightly
  - Similar in other European low incidence countries
- Trend in mean age of cases decreasing slightly
- Low rates of MDR-TB and XDR-TB
Conclusions (2)

- 67% all cases are culture positive
  - 73% of pulmonary cases are culture positive
- Outcome data on 89% cases
  - 72% of all TB cases completed treatment
  - 76% of smear positive TB cases completed treatment
Challenges

• To achieve the target of ≥80% culture confirmation among new pulmonary cases
• To achieve the Stop TB target of detecting at least 70% of new sputum smear positive TB cases and that at least 85% of these cases are cured
• To further improve outcome data
• To reach the elimination target by 2050
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Departments of Population Health Clinicians Laboratories

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