Tuberculosis (TB) 101

- *Mycobacterium tuberculosis*
- Transmitted in air
- Usually affects the lungs, but also other sites
- Common symptoms of TB disease: cough, fever, weight loss
TB Pathogenesis

Infectious TB case → Contact → No Infection
TB Pathogenesis

Infectious TB case ➔ Contact ➔ LTBI ➔ No Infection
TB Pathogenesis

Infectious TB case → Contact → LTBI (No Infection)
TB Pathogenesis

- Infectious TB case
- Contact
- LTBI: ~10%
- No Infection
TB Pathogenesis

Infectious TB case - Contact - LTBI

~10% LTBI - No Infection

LTBI treatment
TB & Homelessness: National Perspective

- 1% of the U.S. population in a given year
- Well established association between TB and the homeless

Photo taken with written consent by Isabelle Sanchez
TB Cases Reported as Homeless in the 12 Months Prior to Diagnosis, Age ≥15, United States, 1993-2012*

*Updated as of June 10, 2013

Note: Homeless within past 12 months of TB diagnosis
CDC Experience: TB and Homelessness

- TB Incidence Rate (homeless): 44 per 100,000
- U.S. TB Incidence Rate: 4 per 100,000
- Over half of the patients involved in TB outbreaks investigated by CDC in 2010–2013 were homeless
TB OUTBREAKS

Photo taken with written consent by Isabelle Sanchez
Outbreak-investigation assistance provided by CDC epidemiologists, 2010–2013

Key
- Outbreak not involving homeless persons
- Outbreak involving homeless persons
### Comparison of outbreaks, by association with homelessness

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Patients predominantly non-homeless (N=14)</th>
<th>&gt;80% patients homeless (N=4)</th>
<th>Total (N=18)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of cases investigated</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean per outbreak</td>
<td>138</td>
<td>233</td>
<td>371</td>
</tr>
<tr>
<td>Median per outbreak</td>
<td>10</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>8</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td><strong>Number of contacts identified</strong></td>
<td>7,888</td>
<td>31,217</td>
<td>39,105</td>
</tr>
<tr>
<td>Mean per outbreak</td>
<td>563</td>
<td>7,804</td>
<td></td>
</tr>
<tr>
<td>Median per outbreak</td>
<td>320</td>
<td>5,935</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>105–2,493</td>
<td>1,393–17,954</td>
<td></td>
</tr>
<tr>
<td><strong>Corrections, n (%)</strong></td>
<td>3 (23%)</td>
<td>0</td>
<td>3 (18%)</td>
</tr>
<tr>
<td><strong>High-incidence jurisdiction, n (%)</strong></td>
<td>0</td>
<td>3 (75%)</td>
<td>3 (24%)</td>
</tr>
</tbody>
</table>
Example 1:
Outbreak Cases — Suburban County A

<table>
<thead>
<tr>
<th>Year of Diagnosis</th>
<th>Number Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1</td>
</tr>
<tr>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>11</td>
</tr>
<tr>
<td>2011</td>
<td>10</td>
</tr>
<tr>
<td>2012†</td>
<td>6</td>
</tr>
</tbody>
</table>

- **Confirmed case**
- **Probable case**
Example 2: Large Outbreak in a High-Incidence Setting

- Approximately 130 TB cases reported as homeless, but 45 cases linked by genotype and epidemiology
  - Indicating recent transmission
- Patients stayed at 10 major shelters while infectious
- Investigation identified 17,954 unique people who stayed at the same shelter overnight with at least 1 infectious case
  - Over 4,700 people stayed >30 nights at the same shelter with at least one infectious case
PREVENTING AND TREATING TB
Interventions to Address TB among Persons Experiencing Homelessness

- Using location-based contact investigations to supplement traditional name-based contact investigations
  - Focus on where patients were while contagious
  - Utilize knowledge of shelter staff about social networks
- Offering incentives and enablers for TB evaluation or treatment (e.g., housing, food, transportation)
- Engaging partners outside of public health who provide services to persons experiencing homelessness
- Providing treatment of TB infection to prevent future cases of TB
TB in Shelters

- Partnerships between with local TB control program and shelters are essential

- Especially during an outbreak, the TB program might need to work with the shelter to conduct active case-finding for TB at the shelter
  - Resource-intensive
  - Challenging to obtain political will
  - Plan for housing and treatment needs to be in place

- Some shelters have feared stigmatization, but needs to be balanced with obligation to inform shelter staff, clients, and volunteers about their risk of TB
Administrative Controls to Prevent and Control TB Transmission

- **Administrative controls**
  - Cough monitor (requires training)
  - Attendance logs & bed maps
  - Symptom screening upon intake (requires training)
  - Establishing timely referral procedures
  - Routine screening for TB for clients & staff

- **National Health Care for the Homeless (NHCHC) offers assistance**
  - Technical assistance can be requested (nhchc.org)

- **Health Resources and Services Administration (HRSA) funds Health Care for the Homeless (HCH) clinics, which have assisted TB programs with TB screening in shelters**
Housing First Programs

- **Housing first programs**: an immediate and primary focus on helping individuals and families quickly access and sustain permanent housing.
- **TB outcomes have never been studied in housing first programs**.
- **Housing first programs have demonstrated**:
  - Improved HIV treatment adherence
  - Improved overall health outcomes
  - Cost savings
  - Improved patient experience
- **Local TB programs identify and help provide housing assistance during intensive phase of treatment**.
Acknowledgments

Julia Interrante  
Rachel Yelk Woodruff  
Courtney Yuen  
Sandy Althomsons  
Tom Navin

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.