Detection and Treatment of Tuberculosis in Correctional Facilities: Opportunities and Challenges

David Karol, MD, MA
Bureau of Prisons, FMC Butner
Duke University Medical Center
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No Disclosures
Primary Objective

The listener will gain an understanding of the unique opportunities and challenges surrounding detection and treatment of tuberculosis in correctional facilities.
Outline

Part I: Overview of tuberculosis (TB) in correctional facilities

Part II: Identification and containment of TB disease in correctional facilities

Part III: Treatment of latent TB infection (LTBI) in correctional facilities
Part I: Overview of TB in Correctional Facilities
TB in Correctional Facilities

- ~3% of all new TB cases are reported from correctional facilities\(^1\)
- ~40% of all those in the US with active TB disease passed through a correctional facility in 1997\(^2\)
- Jail inmates: 17x TB prevalence in the US population
- Prison inmates: 4x TB prevalence in the US population

1. CDC 2003.
### Infectious Disease Burden

<table>
<thead>
<tr>
<th>Condition</th>
<th>Prevalence of Inmates (Jail and Prison)</th>
<th>Number of Inmates with Condition</th>
<th>Number of Releasees with Condition</th>
<th>US Population Total with Condition</th>
<th>Releasees/US Population with Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>1.45–2.03%</td>
<td>35,093–45,522</td>
<td>150,000–196,000</td>
<td>750,000</td>
<td>20.1–26.2%</td>
</tr>
<tr>
<td>AIDS</td>
<td>0.5%</td>
<td>9212</td>
<td>38,894</td>
<td>247,032</td>
<td>15.7%</td>
</tr>
<tr>
<td>Hepatitis C</td>
<td>17–25%</td>
<td>303,507–446,338</td>
<td>1.3–1.9 million</td>
<td>4.5 million</td>
<td>29.4–43.2%</td>
</tr>
<tr>
<td>Active TB</td>
<td>0.04% (P) 0.17% (J)</td>
<td>1451</td>
<td>12,531</td>
<td>31,660</td>
<td>39.5%</td>
</tr>
</tbody>
</table>

*Am J Public Health, 2002;92:11*
Why the high prevalence of TB?

• Inmate factors
  – Intravenous drug and alcohol use
  – Low socioeconomic status
  – HIV
  – Lack of medical care prior to incarceration

• Structural factors
  – Close living quarters
  – Poor ventilation\(^4\)
  – Overcrowding

• Transient population = difficulty in controlling disease

Overcrowding
Incarcerated Americans
1920-2006

Sources:

Rates of Incarceration/100,000 Worldwide

United States
Russia
Cuba
South Africa
England
Canada
Australia
Germany
India
Japan

Response to Crisis

- US Supreme Court 2009: California must operate at 137.5% of capacity (~110K)
- 0.9% annual decline in state and federal inmate population, from 1,614,000 to 1,599,000 (70% due to CA realignment)^5
- Reduction in sentence/compassionate release

5. BJS, 2011.
Is the pendulum swinging?
Public Health Opportunities and Challenges: Focus on Jails

- Prevalence of active TB in jails 4x prevalence in prisons (0.17% vs. 0.04%)
- Population increasing in jails, currently ~745K (1.2% annual increase)
- Approximately 11.6 million persons were admitted to jails in 2012 (~2.5% of US population)
- Length of stay measured in hours to days


BJS, 2012.
Part I (Overview)

• Prevalence of TB disease is 0.04% in prisons and 0.17% in jails
• Prevalence of TB disease in correctional facilities 4-17x the prevalence in US population
• Inmate factors, environmental factors, and frequent movement and short length of stay of inmates contribute to TB prevalence and containment challenges
• Recent decline in prison population and increase in jail population emphasizes important focus areas
Part II: Identification and Containment of TB Disease in Correctional Facilities
Defining Facility’s TB Risk

Minimal risk:

– No cases of infectious TB in the last year
– Facility does not house substantial numbers of inmates with risk factors for TB
– Facility does not house substantial numbers of new immigrants from areas with high rates of TB
– Employees at the facility are not otherwise at risk of TB

CDC, 2006.
Screening for TB

Primary goal: Identify inmates who are likely to have infectious TB before integration into general population

Secondary goal: Identify inmates with latent TB infection (LTBI)

- History and symptom assessment
- Mantoux tuberculin skin test (TST)
- Interferon Gamma Release Assays
- Chest Radiograph Screening
History and Symptom Assessment

- Most rapid screening test
- Easy to administer
- Staff should be trained on procedures for isolation
- Not adequate alone, except in minimal risk facilities
- Often fails to detect pulmonary TB; LTBI only detected by history
Mantoux TST Screening

- TST plus symptom assessment most common method of screening for TB
- Sensitivity ranges from 75-90%; highly nonspecific
- Need for reading after 48-72 hours of placement especially problematic in jails
- Inmates with positive TSTs should have a chest X-ray performed within 72 hours of reading
- Two-step testing may not be practical in jails

CDC, 2006.
How Do Jails Perform?

1986 internal Cook County Jail audit:

• For 49% of inmates with a positive TST, medical personnel took 50 days or more to follow up

• 43% of inmates with positive TSTs were discharged prior to skin test being read

• Mean time to isolation: 17.6 days
How Do Jails Perform?

• A 2006 study of 20 large U.S. jail systems:
  – 95% (19/20) had policies for screening inmates on intake
  – 85% (17/20) asked inmates about a cough; policies for other symptoms varied
  – 85% (17/20) had policies for universal screening within 14 days; 71% (12/17) had policies for TST placement within 24 hours
  – One jail system with voluntary TSTs: 13% placement rate

Am J Prev Med 2006;30(2)
# Interferon Gamma Release Assay

## Advantages
- Higher specificity and at least as sensitive as TSTs for detection of TB disease\(^6\)
- Only single visit required
- Result unaffected by previous BCG vaccination result
- No boosting effect

## Limitations
- Need for phlebotomy
- Lab process time of 8-30 hours\(^7\)
- Higher direct cost per test
- Lack of clinical experience in interpreting results
- Negative test does not exclude possibility of TB infection

\(^6\) Exp Rev Mol Diag 2006, 6(3).
\(^7\) CDC, 2011.
Chest Radiograph Screening

• Can increase TB case-finding rate
• Enables quicker isolation of suspected TB cases\(^8\)
• Cost-effective\(^9\)
• Cook County Chest-X-ray screening compared to TST (1992-94):\(^{10}\)
  • 43 vs. 26 cases of active TB/year
  • Time to isolation reduced from 17.2 to 2.3 days
• Bureau of Prisons study: no change in disease detection in foreign-born inmates, but 8-fold increase in isolation and diagnostic work-up\(^{11}\)

11. Pub Hlth Rep, 2001(116)
Summary: Part II (Screening)

• First step: Identify facility’s risk of TB transmission
• Two goals:
  – Identify cases suspected of TB disease
  – Identify LTBI
• Symptom assessment and TST most common method of screening
• Universal CXR, IGRAs may be considered in high-risk and/or short-term facilities
Part III: Treatment of LTBI in Correctional Facilities
<table>
<thead>
<tr>
<th>Drugs</th>
<th>Duration</th>
<th>Interval</th>
<th>Minimum doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid</td>
<td>9 months</td>
<td>Daily</td>
<td>270</td>
</tr>
<tr>
<td>Isoniazid</td>
<td>6 months</td>
<td>Twice weekly*</td>
<td>76</td>
</tr>
<tr>
<td>Isoniazid &amp; Rifapentine</td>
<td>3 months</td>
<td>Once weekly*</td>
<td>52</td>
</tr>
<tr>
<td>Rifampin</td>
<td>4 months</td>
<td>Daily</td>
<td>12</td>
</tr>
</tbody>
</table>

*Use Directly Observed Therapy (DOT).*
Table 4. Evaluation and treatment outcomes in jails versus prisons among inmates who had positive tuberculin skin test

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Jails (%)</th>
<th>Prisons (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incomplete tuberculosis evaluation</td>
<td>17.1</td>
<td>0.4</td>
</tr>
<tr>
<td>Prior adequate therapy</td>
<td>3.2</td>
<td>27.4</td>
</tr>
<tr>
<td>Treatment completed</td>
<td>33.6</td>
<td>57.7</td>
</tr>
<tr>
<td>Lost before treatment completed a</td>
<td>53.9</td>
<td>17.0</td>
</tr>
</tbody>
</table>

*aLost includes patients who moved, were paroled, or were transferred from the facility.*
Why bother treating LTBI in jails?

- Low medication adherence rates upon release\textsuperscript{12}
- Poor follow-up\textsuperscript{13}
- Bandyopadhyay et al (2002)\textsuperscript{14}:
  - 82/168 (49%) releasees presented to clinic
  - 33/82 (40%) had to be restarted on therapy
  - 35/82 (55%) completed adequate course
  - 2.68 reactive TB cases prevented
  - Projected cost savings of $9,277/4.5 years

\textsuperscript{12} Am J Respir Crit Care Med 1997;155.
\textsuperscript{13} Am J Public Health 1988;88.
\textsuperscript{14} Chest, 2002;121.
Isoniazid/Rifapentine

- Shorter regimen (3 vs. 4, 6 or 9 months)
- Directly observed INH/RPT as efficacious as self-administered INH with higher completion rate\(^\text{14}\)
- Cost-effective in general population\(^\text{15, 16}\)
- Not to be used in patients with HIV/AIDS on anti-retrovirals or in pregnant patients
- Should not be used in facilities with INH- or RIF-resistant *M. tuberculosis* strains

Summary: Part III (LTBI)

- Treatment of LTBI in jails challenging but potentially cost-effective and beneficial to public health
- INH/rifapentine promising regimen, particularly for short stays
Conclusion

• Significant representation of both TB disease and LTBI in correctional facilities makes for great public health opportunity
• TB in correctional facilities affects the general community
• Transient jail population makes screening and treatment particularly challenging
• Coordinated efforts with local public health authorities extremely important
Questions?