

# TB in Inmates of Correctional Facilities

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# TB in Prisons

- Prisons are recognised amplifiers of TB transmission
  - House disproportionately higher number of inmates with risk factors for TB
    - HIV infection, i/v drug abuse, malnutrition
    - From lower socio-economic group
  - Living conditions conducive to spread of disease
    - Overcrowding; poor ventilation
    - Frequent transfers within prison system

# TB in Prisons

- Poor TB control in prisons will have a spill-over effect into the community
- TB control in prisons should be a priority of and integrated into the civilian / national TB control programme
- Challenges
  - Prisoners health – neglected area
  - Prisons health service may be under different ministry
    - inter-ministry collaboration needed

# Annual case notification rate for all forms of TB in prisons in countries with high prevalence of TB

Coninx R et al. *BMJ* 2000;320:440-442

Author	Location	Year	Rate Per 100,000
Drobniewski	Siberia, Russia	1993	6500
Wares	Tomsk, Russia	1996	7000
Bollini	Chisinau, Moldova	1996	2640
Coninx	Baku, Azerbaijan	1994	4667
Aerts	Tbilisi, Georgia	1998	6500
Koffi et al	Bouake, Ivory Coast	1992	7200
Auregan et al	Atananarivo, Madagascar	1993	2400
Nyanguku et al	Zomba, Malawi	1996	5100

# TB prevalence in prisons

- US CDC National TB surveillance system 1993-2003
  - Federal and state prison case rates were 29.4 and 24.2 / 100,000 (cf 6.7 / 100,000 in non-prisons populatio)
    - *Am J Public Health* 2005;95(10):1800-1805
- Europe – 2002 survey
  - 22 countries; median TB notification rate 232 / 100,000 inmates (up to 83.6 times civilian population)
    - *Int J Tuberc Lung Dis* 2006;10(11):1215-1223

# Prisons in Asia Pacific Region

- 1997 survey of TB control practices in 15 countries in WHO Western Pacific Region showed inconsistencies in
  - Reporting of cases to national health authorities
  - Use of DOT
  - Transfer of prisoner on release to community treatment services
    - *Int J Tuberc Lung Dis* 1999;3(9):769-773
- Prevalence of smear-positive cases in Thai prisons:
  - 568/100,000 (8 times higher than general population)
    - *Int J Tuberc Lung Dis* 2002;6(3):208-214
  - 354.8/100,000 inmates
    - *Int J Tuberc Lung Dis* 2007;11(5):556-561

# DNA fingerprinting evidence for TB transmission in prisons

- Chaves F et al. *Am J Respir Crit Care Med* 1997;155:719-725
  - 216 cases (case rate 2,283/100,000 per year)
  - 87% HIV-infected
  - 74% of isolates grouped in 25 clusters; recent infection inferred in 62%
- Sretrirutchai S et al. *Int J Tuberc Lung Dis* 2002;6(3):208-214
  - 49 cases; 21 culture positive (smear+ case rate 568/100,000)
  - 35% HIV-infected
  - 38% clustering
  - 39% resistant to INH

# Prisons present an opportunity to intervene in TB control

- Active case finding in high risk individuals who might otherwise not have access to healthcare
- Treatment under Directly-observed therapy (DOT) in setting where adherence may be assured
- Opportunity for LTBI treatment in high-risk individuals

# Routine screening at entry

- The highest priority is to detect and treat the active (infectious) TB case – such cases should not be allowed to enter the facility
- Pre-entry identification of TB suspects for sputum examination needed
- Ideal method not agreed upon – dependent on
  - Resources available – personnel, technology
  - Prevalence of disease
  - Epidemiology of risk factors

# Pre-entry Screening Methods

- Questionnaire – symptoms, history of TB
  - Cross-matching with TB registry
- Chest radiograph
- Tuberculin skin test / Interferon gamma assay

# Questionnaire

- Low predictive value, non-specific
- Standard WHO questionnaire
  - Symptom score (5/7)
  - Anti-TB treatment in last 5 years
  - BMI < 20
- International Standards for Tuberculosis Care (ISTC)
  - Presence of productive cough  $\geq$  2 to 3 weeks

Jittimane S X et al. A prevalence survey for smear-positive tuberculosis in Thai prisons  
*Int J Tuberc Lung Dis* 2007;11(5):556-561

- Survey of 27 prisons in Thailand using WHO questionnaire with follow-up sputum collection identify 254 sputum smear-positive cases (354.8/100,000)
- PPV of WHO standard questionnaire was 1.2%
- PPV of ISTC standard questionnaire was 5.9%

# Chest radiograph screening

- Resource-rich countries : recommended for facilities which house substantial numbers of inmates for short periods and serve populations at high risk for TB
- Miniature chest radiograph screening for tuberculosis in jails. A cost-effective analysis. Timothy F Jones and Willian Scaffner *Am J Respir Crit Care Med* 2001;164:77-81

# Chest radiograph screening

- Sensitivity up to 95%; specificity as low as 69% in populations already selected out by symptom screening
- Detects early disease, results may be immediately available
- Dependent on quality of films and reader (significant inter and intra-observer variation)
- High capital, running and maintenance costs, training costs; logistical issues

# Routine detection system post-entry into prison

- Passive case finding
  - Dependent on prisoners' threshold for reporting of symptoms
  - Prison staff need to be vigilant
- Active case finding
  - ? Screening method
  - ? Optimal screening frequency
  - ? Contact screening for those exposed to infectious index case

# Prevalence of pulmonary tuberculosis and comparative evaluation of screening strategies in a Brazilian prison

A Sanchez et al. *Int J Tuberc Lung Dis* 2005;9(6):633-639

- Cross-sectional study of inmates in Rio de Janeiro prison
- Using chest radiograph as reference, studied three targeted screening strategies to identify TB suspects
  - cough > 3 weeks
  - WHO score  $\geq 5$
  - Presence of at least one potentially TB-related symptom
- Conclusions
  - Prevalence of 4.6% TB cases
  - All three targeted screening strategies were unreliable

# Chest radiograph screening for tuberculosis in a Hong Kong prison

CC Leung et al. *Int J Tuberc Lung Dis* 2005;9(6):627-632

- 814 long-stay prisoners in maximum security prison screened with CXR
- 10 active cases (2 culture positive) diagnosed
- Yield of 1.23%
  - vs 0.98% for household contacts of smear positive cases
  - vs 0.32% for routine screening of HIV-infected persons

Yield of 3.1% in those who did not have CXR in last two years

# Contact screening and LTBI treatment in Singapore correctional facilities

*Int J Tuberc Lung Dis* 2005;9(11):1248-1252

- Singapore :
  - no routine CXR screening pre-entry
  - Since 1999: contact screening for inmates exposed to infectious TB case in prisons
- Contact screening yield among prisoners vs community contacts
  - Active case: 1.1% vs 0.7%
  - TST  $\geq$  15 mm: 39% vs 22%
  - TST conversion: 43% vs 20%

# HIV-infected inmates

- In facilities with large numbers of HIV-infected or if HIV-infected are cohorted together
  - Risk of outbreak among this vulnerable group
  - McLaughlin S et al. Int J Tuberc Lung Dis 2003;7(7):665-672
  - Extensive transmission of TB in HIV-infected prison inmates and subsequent transmission in the community
  - Source case living in prison dormitory housing > 300 HIV-infected men caused 30 additional cases within 6 months of diagnosis and 2 further cases 2 years later
  - 66% documented TST conversion

# HIV-infected

- Chest radiograph screening for known or suspected HIV-infected persons prior to prison entry
- HIV-infected inmates exposed to infectious TB case to be given preventive therapy regardless of TST result (after excluding active disease)

# Infection Control

- Isolation of suspected cases until diagnosis is ruled out
- Surveillance of prison staff

# Infection Control

- Isolation of TB suspect until diagnosis is ruled out / appropriate treatment started and patient rendered non-infectious
  - Airborne infection precautions
  - Environmental controls

Surveillance of prison staff

# Treatment of TB disease

- Isolation of patient until rendered non-infectious
- Use of standard TB regimens under DOT
- Case management

# Integration of prisons TB control with civilian TB control programme

- On release from prison
  - High likelihood of default
  - Linkage of prison and civilian TB control programmes for continuation of treatment and follow-up vital

- *“Correctional systems are strategically poised to either fuel TB outbreaks through the endemic transmission of M. tuberculosis or to further reduce TB incidence by the screening, treatment and prophylaxis of elusive high risk populations”*

- *N Kendig, MD, Federal Bureau of Prisons, Washington DC. USA*