Tuberculosis in Hong Kong

TB & Chest Service
Centre for Health Protection
Department of Health
Hong Kong SAR
China
Demographics & geography
Hong Kong

- South of Mainland China
- Population = ~6,900,000
- Area = 1098 sq km
- Population density = ~6300 per sq km
全日開放的診所
Full-time Chest Clinics
1. 石硤尾胸肺科診所
Shek Kip Mei Chest Clinic
2. 西營盤胸肺科診所
Sai Ying Pun Chest Clinic
3. 九龍胸肺科診所
Kowloon Chest Clinic
4. 筲箕灣胸肺科診所
Shaukeiwan Chest Clinic
5. 湾仔胸肺科診所
Wanchai Chest Clinic

部份時間開放的診所
Part-time Chest Clinics
6. 全日開放的診所
Wong Tai Sin Chest Clinic
7. 筲箕灣胸肺科診所
Shaukeiwan Chest Clinic
8. 西營盤胸肺科診所
Sai Ying Pun Chest Clinic
9. 九龍胸肺科診所
Kowloon Chest Clinic
10. 筲箕灣胸肺科診所
Shaukeiwan Chest Clinic
11. 湾仔胸肺科診所
Wanchai Chest Clinic
12. 大埔胸肺科診所
Tai Po Chest Clinic
13. 圓洲角胸肺科診所
Yuen Chau Kok Chest Clinic
14. 容鳳書胸肺科診所
Yung Fung Shee Chest Clinic
15. 仁愛胸肺科診所
Yan Oi Chest Clinic
16. 東九龍胸肺科診所
East Kowloon Chest Clinic
17. 南葵涌胸肺科診所
South Kwai Chung Chest Clinic

肺科醫院
Chest Hospitals
A. 葛量洪醫院
Grantham Hospital
B. 灵實醫院
Haven of Hope Hospital
C. 肺科醫院
Chest Hospitals
D. 車公廟醫院
Ruttonjee Hospital
E. 松樹山醫院
TWGHs Wong Tai Sin Hospital
SOURCES OF CARE FOR PATIENTS WITH TUBERCULOSIS IN HONG KONG

PATIENT WITH TUBERCULOSIS

**PRIMARY LEVEL**

- Private Practitioner
- Department of Health CHP Chest Clinic
  - 18 clinics
  - ~7,000 new patients each year
- Department of Health General out-patient clinics
- Hospital Authority Accident and Emergency Departments

**SECONDARY LEVEL**

- Private Hospitals
- Hospital Authority Chest Hospitals
  - 5 hospitals
  - 800 beds
  - 7,000 in-patient episodes
- Hospital Authority General Hospital
- Hospital Authority Specialist Out-patient Clinics
Data from TB laboratories and death certificates are crossed matched with the TB notification registry to trace back under-notified cases.
TB Control Measures

- Surveillance
- DOTS
- Case finding, contact examination and preventive measures
- Treatment of LTBI
- BCG
- Health education
- Research
TB notification rate in 2006 = 85.4 per 100,000 (provisional figure)
TB notification in Hong Kong (1952 - 2006)

Year

Stagnant trend
WHO
Western Pacific Region

• Hong Kong as a place with intermediate TB burden
TB mortality rate (1951-2006)
Average age of death (1949-2005)
Population pyramids

1971 (mid-year)

2005 (mid-year)

Population (in thousands)
Percentage of elderly among TB patients and the general population
(1962-2006)
* Arising from transmission of tubercle bacilli. More readily controlled by DOTS (directly observed treatment, short course), to stop TB transmission at the source.

# Arising from reactivation of past infection contracted many years ago. It is controlled by treatment of latent TB infection (i.e., preventive treatment). However, this is an inefficient TB control measure requiring a long period to have significant effect on the TB epidemiology.
Comparison between the observed notification data among males in different age groups and model predictions of disease incidence during the period 1967-2015, based on best-fitting estimates of the risks of disease and assuming that the annual risk of infection was 10% in 1950, and that it declined by 7.5% pa until 1967, by 13.5% pa between 1967 and 1978. In the figures in the left-hand panel (A) the decline in the annual risk of infection is assumed to have halved after 1978 to 6.75% pa. In the figures in the right-hand panel (B) the annual risk of infection is assumed to have remained unchanged after 1978. The shaded areas reflect model predictions of the proportion of disease attributable to recent infection, reinfection and reactivation. Note that, as a result of the high prevalence of infection in all the age groups considered here, none of the disease incidence is attributed to recent (primary) infection.

Vynnycky E, et al.
Limited impact of tuberculosis control in Hong Kong – attributable to high risks of reactivation disease
Screening/ treatment for latent TB infection in Hong Kong

Service basis:

- Close contacts under the age of 35
- HIV sero-positive patients
- Others (e.g., immunocompromised patients, e.g., those on anti-TNF therapy)
- Silicotic patients
LTBI – local studies

• T-spot test / Quantiferon-Gold (interferon-gamma assay)
  – Close contacts
  – Silicotics
  – HIV infected
### TB contact screening in Hong Kong (www.info.gov.hk/tb_chest)

<table>
<thead>
<tr>
<th>Targeted subgroups</th>
<th>Circumstances</th>
<th>Strategy</th>
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</thead>
<tbody>
<tr>
<td>Close contacts (household) under 5</td>
<td>Index case smear –ve</td>
<td>Flow chart A</td>
</tr>
<tr>
<td></td>
<td>Index case smear +ve</td>
<td>Flow chart B</td>
</tr>
<tr>
<td>Close contacts (household) above 5</td>
<td>Index case smear –ve</td>
<td>CXR</td>
</tr>
<tr>
<td></td>
<td>Index case smear +ve</td>
<td>Flow chart B</td>
</tr>
<tr>
<td>Close contacts (household) age ≥34</td>
<td>Index case smear –ve/ve</td>
<td>CXR (or flow chart B in special circumstances)</td>
</tr>
<tr>
<td>Social contacts in special occasions</td>
<td>Individual assessment</td>
<td></td>
</tr>
</tbody>
</table>
| Contact examination in institutions (schools, elderly homes, etc.) | General principles:  
  1. High risk of infectiousness: smear +ve index case  
  2. Vulnerable group: very old, very young  
  3. Signs of spread of infection: clustering of cases | Mass contact examination |

### Contact investigation of close contacts aged below 5 with smear-negative index cases (Flowchart A)

1. Index case with smear –ve TB
   - TST + clinical assessment
     - (If age <3 month and clinically well, perform TST after 3 month)
     - TST ≤ 9 mm and clinically well → TST ≥ 10 mm or clinically unwell
     - Health education ← Normal ← CXR → Abnormal

### Tuberculin testing and treatment of LTBI among immunocompetent household contacts aged under 35 of smear +ve pulmonary TB (Flow-chart B)

1. Index case with smear +ve pulmonary TB
   - Immunocompetent household contacts aged under 35
   - Age under 1
     - Health education on early recognition of symptoms suggestive of TB
     - CXR + clinical
       - Normal ← Anti-TB treatment
       - Active TB
       - TST with 2 unit of PPD-RT23 (TTa)
         - TTa ≤14 mm
           - TTa or TTb ≥15 mm, or documented TST conversion (TTb – TTa ≥10 mm))
             - Fit for treatment of LTBI with:
               - - consent
               - - no medical contraindication
               - Treatment of LTBI with INH (or 6 months or other regimens where appropriate, e.g. index case with resistance to INH)
             - Observe
             - Yes
       - TTa >14 mm
         - TTb ≤15 mm, and TTb – TTa <10 mm
           - Treatment of LTBI with INH (or 6 months or other regimens where appropriate, e.g. index case with resistance to INH)
           - Observe
           - Yes
       - TTa ≤14 mm
         - Observe
         - No
   - Age 1-34
     - CXR
       - Normal
       - TST + clinical assessment
         - Normal
         - Anti-TB treatment
         - No history of anti-TB treatment
         - History of anti-TB treatment
       - TST with 2 unit of PPD-RT23 (TTa)
         - TTa ≤14 mm
           - TTa or TTb ≥15 mm, or documented TST conversion (TTb – TTa ≥10 mm))
             - Fit for treatment of LTBI with:
               - - consent
               - - no medical contraindication
               - Treatment of LTBI with INH (or 6 months or other regimens where appropriate, e.g. index case with resistance to INH)
             - Observe
             - Yes
         - TTa >14 mm
           - TTb ≤15 mm, and TTb – TTa <10 mm
             - Treatment of LTBI with INH (or 6 months or other regimens where appropriate, e.g. index case with resistance to INH)
             - Observe
             - Yes
         - TTa ≤14 mm
           - Observe
           - No
   - Stop INH: Give BCG if previously given within 2 months of starting INH
   - Treatment of LTBI for a total of 6 months
   - FU at 1 year with telephone interview

### Additional Information
- Index case with smear –ve TB
  - CXR
    - Abnormal
  - Health education ← Normal ← CXR → Abnormal
## Treatment of LTBI

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007 *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible for Rx of LTBI</td>
<td>1081</td>
<td>1290</td>
<td>1808</td>
<td>763</td>
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<tr>
<td>Agreed to TST</td>
<td>407</td>
<td>408</td>
<td>618</td>
<td>245</td>
</tr>
<tr>
<td>Eligible for Rx of LTBI after TST</td>
<td>198</td>
<td>200</td>
<td>286</td>
<td>38</td>
</tr>
<tr>
<td>Agreed to receive Rx of LTBI</td>
<td>99</td>
<td>66</td>
<td>116</td>
<td>28</td>
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</table>

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007 *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible for Rx of LTBI</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Agreed to TST</td>
<td>37.7</td>
<td>31.6</td>
<td>34.2</td>
<td>32.1</td>
</tr>
<tr>
<td>Eligible for Rx of LTBI after TST</td>
<td>18.3</td>
<td>15.5</td>
<td>15.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Agreed to receive Rx of LTBI</td>
<td>9.2</td>
<td>5.1</td>
<td>6.4</td>
<td>3.7</td>
</tr>
</tbody>
</table>

* 2007 figures are Jan-Jun 2007 figures
Setting standards for the management of TB

Professional Manual 2006
(available for download at www.info.gov.hk/tb_chest)
Some problems in the implementation of DOTS

- Patient’s acceptance
  - inconvenient
    - time / distance
    - work problem
  - human rights
## Treatment Results (2004 cohort) (Bacteriologically +ve cases)

<table>
<thead>
<tr>
<th></th>
<th>DOTS</th>
<th>non-DOTS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>New bact +ve</td>
<td>Relapse</td>
</tr>
<tr>
<td><strong>Z Cohort</strong></td>
<td>2,777</td>
<td>392</td>
</tr>
<tr>
<td><strong>A Cure</strong></td>
<td>1,921</td>
<td>234</td>
</tr>
<tr>
<td><strong>B Rx completion</strong></td>
<td>290</td>
<td>28</td>
</tr>
<tr>
<td><strong>C Death</strong></td>
<td>153</td>
<td>26</td>
</tr>
<tr>
<td><strong>D Failure</strong></td>
<td>236</td>
<td>47</td>
</tr>
<tr>
<td><strong>E Default</strong></td>
<td>97</td>
<td>18</td>
</tr>
<tr>
<td><strong>F Transfer</strong></td>
<td>80</td>
<td>39</td>
</tr>
</tbody>
</table>

|                  | 2,777 | 100.0 | 392 | 100.0 | 2 | 28 | 100.0 | 760 | 100.0 |
## Treatment results (2004 cohort) (Smear +ve cases)

<table>
<thead>
<tr>
<th>Cohort</th>
<th>New smear +ve</th>
<th>Relapse</th>
<th>ReRx after failure</th>
<th>ReRx after default</th>
<th>Non-DOTS</th>
<th>New smear +ve</th>
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</thead>
<tbody>
<tr>
<td>Z Cohort</td>
<td>1,356 %</td>
<td>195 %</td>
<td>1</td>
<td>13 %</td>
<td>337 %</td>
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### DOTS

<table>
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<tr>
<th>Event</th>
<th>Count</th>
<th>Percentage</th>
<th>Count</th>
<th>Percentage</th>
<th>Count</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>New smear +ve</td>
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<tr>
<td>Relapse</td>
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<tr>
<td>ReRx after failure</td>
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<td></td>
</tr>
<tr>
<td>ReRx after default</td>
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</table>

### non-DOTS

<table>
<thead>
<tr>
<th>Event</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>New smear +ve</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Details

- **A. Cure**: 977 (72.1%), 114 (58.5%), 0, 3 (23.1%), 19 (5.6%)
- **B. Rx completion**: 110 (8.1%), 14 (7.2%), 1, 1 (7.7%), 1 (0.3%)
- **C. Death**: 77 (5.7%), 12 (6.2%), 0, 1 (7.7%), 4 (1.2%)
- **D. Failure**: 113 (8.3%), 25 (12.8%), 0, 5 (38.5%), 3 (0.9%)
- **E. Default**: 42 (3.1%), 10 (5.1%), 0, 2 (15.4%), 0 (0.0%)
- **F. Transfer**: 37 (2.7%), 20 (10.3%), 0, 1 (7.7%), 310 (92.0%)
(Treatment success rate)

• At one year: about 80%
• At two year: about 85%
### Case detection and treatment success rates

**Case detection (%)**  | **New smear +ve (%)**  | **New smear +ve (%)**  | **Treatment success rate**
--- | --- | --- | ---
**Global**  | **Whole country**  | **DOTS**  | 

<table>
<thead>
<tr>
<th>Country</th>
<th>New and relapse cases</th>
<th>New smear +ve</th>
<th>New and relapse cases</th>
<th>New smear +ve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainland China</td>
<td>64</td>
<td>80</td>
<td>64</td>
<td>80</td>
</tr>
<tr>
<td>Hong Kong (China)</td>
<td>104</td>
<td>67</td>
<td>82</td>
<td>53</td>
</tr>
<tr>
<td>Macao</td>
<td>92</td>
<td>81</td>
<td>92</td>
<td>81</td>
</tr>
<tr>
<td>Japan</td>
<td>73</td>
<td>67</td>
<td>62</td>
<td>57</td>
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<tr>
<td>Malaysia</td>
<td>58</td>
<td>73</td>
<td>58</td>
<td>73</td>
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<tr>
<td>Singapore</td>
<td>104</td>
<td>100</td>
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<tr>
<td>United States</td>
<td>104</td>
<td>85</td>
<td>104</td>
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</tr>
<tr>
<td>United Kingdom</td>
<td>96</td>
<td>48</td>
<td>NA</td>
<td>NA</td>
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(* 85% at 24 month) (* 24月為85%)
Drug-resistant tuberculosis

- multidrug-resistant TB
  - around 1% of bacteriologically positive cases

- extensively drug resistant TB
  - around 0.1% of bacteriologically positive cases
Drug-resistant TB (MDR-TB / XDR-TB)

• Healthcare structure
  – Territory-wide network of chest clinics and clinical services
  – DOTS/ DOTS-plus
  – TB Reference Laboratory (one of the Supranational TB Reference Laboratories in Western Pacific Region, designated by WHO in 2006)
  – Vigilant surveillance system

• Case management
  – Use of second-line drugs (generally readily available)
  – Supportive measures (rest, diet, avoid smoking)
  – Counselling and health education (public health issues)
  – Treatment success (till end of treatment ~ 24 month):
    • MDR-TB: 60 to 80%
    • XDR-TB: around 50%

• Monitoring/ parameters
  – Rates:
    • MDR-TB: around 1% of bacteriologically-positive TB cases
    • XDR-TB: around 0.1% (on average about 3 cases each year) (no known HIV-seropositive cases of XDR-TB locally)
  – Mortality rate of XDR-TB:
    • 30% during early phase up to 3 years
    • Others: may deteriorate and die from TB or other coexisting diseases
TB Epidemiology in Hong Kong – summary

- Notification rate: general downward trend with a stagnant trend in recent years
- Death rate: decline faster than notification rate
- Probable reasons for a stagnant trend in recent years:
  - Strengthening of surveillance system
  - Ageing population
    - Increasing proportion of TB among elderly subjects
    - Slow decline in notification rate among elderly subjects
  - Prolonged survival of subjects with chronic debilitating illnesses
  - Mobile population
  - Increasing importance of LTBI
Control of TB in Hong Kong - challenges

- Dense population
- Population movement
- Ageing population
- High prevalence of disease in the neighbourhood
- High prevalence of infection locally

Others:
- Level of drug resistance
- Level of education of the public
- TB as a stigma
- Defaulters
- HIV infection
<table>
<thead>
<tr>
<th>Year</th>
<th>Rate (per 100,000) (in log scale)</th>
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<td>1962</td>
<td>10</td>
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<tr>
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<td>2004</td>
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</table>

**TB rates in countries/places (Western Pacific Region)**

- Macao
- Hong Kong
- Japan
- Korea
- Malaysia
- Singapore
- Philippines
Thanks!

Website of “TB in Hong Kong” :
www.info.gov.hk/tb_chest