Active TB case finding in the Western Pacific Region experience and policy direction

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• Importance of ACF for TB control in the Region
• Experience of ACF in the Region
• ACF targeting tool – to guide TB REACH project formulation
• Suggestions for ACF guidelines
  – Risk-by-Risk approach
  – Consideration for tailored care and support
Increasing importance of ACF

- Case detection stagnating in most of the countries in the Region
- TB concentrates among high risk populations
- Emerging challenges
  - Migrants
  - Urban poor
  - Emerging risk factors for TB
    - Aging, tobacco, diabetes
- Low diagnostic sensitivity
- Infectious patients with minor symptoms may not seek care
Migrant TB burden in Malaysia
Number and % of migrant among all TB cases, by State, 2008

<table>
<thead>
<tr>
<th>State</th>
<th>Number of migrant TB cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sabah</td>
<td>355</td>
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<tr>
<td>Selangor</td>
<td>134</td>
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<tr>
<td>Johor</td>
<td>375</td>
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<tr>
<td>Kuala Lumpur</td>
<td>959</td>
</tr>
</tbody>
</table>

% migrant among all TB cases:
- 0.000 - 3.000
- 3.000 - 5.000
- 5.000 - 7.000
- 7.000 - 28.000

Source: World Health Organization, Western Pacific Regional Office
Experience in ACF (1)
Prisons and confined settings

Entry screening
• e.g. Mongolia
  – ‘double entry screening’ with fluorography film
  – Significant reduction of TB burden

Periodic (or project-based) screening
• e.g. Viet Nam
  – X-ray → Microscopy + Culture
  – Prevalence 1560 (S+) 2537 (C+) per 100 000 (NNS 40)
• e.g. Cambodia
  – X-ray → Microscopy
  – Prevalence 950 (S+) per 100 000 (NNS 105)

‘Enhanced’ case finding
• Philippines
  – Peer cough monitoring – cough surveillance
Reduction of TB burden among prisoners in Mongolia

- **Decline in TB CNR**
  - Prison vs national
    - 18 times in 2001
    - 10 times in 2005
    - 5 times in 2008

- **Improvement of entry TB screening on detention (461) and on allocation (401)**

- **Decline among sentenced prisoners (Red)**

Joint Ministerial Order: Screening policy established

- 100% entry screening with GF support
- Equipment upgraded

Global Fund support

Continuous improvement of prison conditions
Experience in ACF (2)
TB contact investigation

Routine CI established and reported
- e.g. China, Mongolia, Malaysia and other IBCs
- Yield tends to vary…problem in implementation level?
  Low sensitivity of the procedures?
  Other environmental determinants?

Policy established but weak implementation and reporting
- e.g. Many HBCs
- Too labor intensive for over-stretched health systems

CI combined with community-based ACF in Cambodia
- Unique strategy in Cambodia
- Can be very cost-effective

- Define target areas with high TB case load
- Identify smear positive index cases from TB register and:

  Strategy 1 (Adult contacts):
  - House-to-house symptom screening + microscopy sessions

  Strategy 2 (Adult contacts):
  - House-to-house invitation + X-ray & microscopy sessions

  Strategy 3 (childhood contacts):
  - House-to-house invitation + PPD sessions
Community-based ACF in Cambodia: A step-wise approach

Step 1: Geographical targeting based on TB case load and socio-economic status

Step 2: Local advocacy meeting

Step 3: Community volunteers conduct house-to-house visit and invite contacts and TB suspects to ACF sessions

Step 4: ACF team (stay 1-2 weeks) screen all TB suspects with mobile X-ray

Step 5: Three sputum smear microscopy for diagnosis

Step 6: Treatment follow-up by local health workers and volunteers

Target Community

TB suspects

Abnormal chest X-ray

Microscopy
Rationale for “Retrospective” CI

• Routine contact investigation in HBCs
  – Should be done as much as possible
  – But…difficult to implement fully

• Contacts have increased risk of active TB disease for several years
  – One time CI might miss many cases
  – Cumulating cases for 1-2 years can be cost-effective

• Contacts share same environmental risks with their index


Results (2005-2010)
How much yield we can get?

TB cases diagnosed:
(among all participants attended ACF sessions)
All TB: 6% to 12%
NNS: 8 ~ 17
Smear +ve: 2% to 3.5%
NNS: 28 ~ 50

* A systematic review (Morrison et al, 2008) reported pooled yields of 4.5% and 2.3% for all and confirmed TB respectively.
Was it cost-effective?

- Cost data was available for the sessions in 2010
- The strategy is highly cost effective
  - Cost per case identified
    - Diagnostic cost: $21 per case
    - Overall cost: $113 per case (logistics and operations cost)

  (c.f. TB REACH criteria $350 per case diagnosed and successfully treated)
The upgraded strategy for TB REACH Project 2011

• Better area targeting using:
  – Socio-economic indicators (poverty, health access, etc)
  – TB case load

• Further increase the yield
  – Screening: Symptom + X-ray for all contacts
  – Diagnostic: Xpert MTB/RIF
  – Target adult and childhood contacts together
A tool for ACF targeting and strategy selection

→ Guidance was needed to support formulating ACF projects (for TB REACH)
→ An electric tool for ACF targeting developed

What factors determine the yield and cost-effectiveness of ACF?

1. TB prevalence among the target
   • Higher prevalence → higher yield

2. Diagnostic algorithms
   • More comprehensive screening → higher cost & yield

3. Targeting approaches (not yet included)
   • Scattered target → higher ‘opportunity’ cost
1. TB Prevalence among the target

- Number needed to screen (NNS) shoot up as TB prevalence goes down

- Roughly, ACF is not feasible for a target < 0.5% prevalence (if X-ray for all)

- However, NNS alone cannot guide whether we should target or not
  - Diagnostic cost significantly varies between dx algorithms
  - Operational and logistics cost also different for each target/context

- How to find populations with > 0.5% prevalence?
2. Diagnostic algorithms and yields

Model algorithms

1. Symptom screening → microscopy 
   (routine programme model) 
   low cost & low yield
2. Symptom → microscopy + x-ray
3. X-ray + symptom → microscopy
4. X-ray + symptom → microscopy + culture 
   (prevalence survey model) 
   high-cost & high-yield
5. X-ray + symptom → Xpert MTB/RIF 
   (prevalence survey model with Xpert) 
   high cost model with Xpert
6. Symptom → X-ray → Xpert MTB/RIF 
   low cost model with Xpert

Estimating yields

- How many TB cases detected for each algorithm roughly defined by suspect/yield profile as below example
- Important to note that:
  - Initial symptom screening substantially decrease a yield
  - Low sensitivity of microscopy

Fig. An example of yield profile based on the prevalence survey, Cambodia 2002.
An example of the tool outputs:
Diagnostic cost per case detected

- **Prevalence > 2%**
  - Cost effective for all strategies including prevalence survey models (culture or Xpert)

- **Prevalence 1-2%**
  - X-ray screening (strategy 3) may be still cost-effective
  - Culture probably feasible but requires careful planning

- **Prevalence <1.0%**
  - Up to strategy 1 & 2 acceptable (i.e. routine procedure)

* Cut-off of USD 200 are arbitrary. TB REACH criteria employ USD 350 per case detected and successfully treated.
General observations from the tool outputs

- Conservative algorithm can be acceptable even NNS is high
- The higher the prevalence → the more extensive approach → high yield

However, we have a dilemma…
  - Very high risk groups → tend to be small
  - Lower risk groups → larger size and difficult to target

So the key is to find a high risk target with a good pop size

Risk-by-Risk – combining multiple risks – might be a way to manipulate a risk profile and a target size
  e.g. Geographical targeting x TB contacts (Cambodian Retro CI),
    Deported migrants x detention history (another TB REACH project in Cambodia)
Narrowing down the target: **Risk x Risk approach**

**(Elderly x diabetics)**

Cumulative hazards for active TB by diabetic status, among a cohort of clients (>65yrs) registered with an elderly health service in Hong Kong

- HbA1c >= 7%:
  - annual incidence
  - 422 per 100 000

- No diabetes:
  - annual incidence
  - 214 per 100 000


**(Elderly x smokers)**

Cumulative hazards for active TB by smoking status, among a cohort of clients (>65yrs) registered with an elderly health service in Hong Kong

- Current smoker:
  - annual incidence
  - 735 per 100 000

- Ex-smoker:
  - annual incidence
  - 427 per 100 000

- Never smoked:
  - annual incidence
  - 174 per 100 000

Neighborhood factor analysis for geo-targeting

- Neighbourhood factor analyses using socio-economic characteristics have a potential to guide geo-targeting

- Risk micro-stratification to identify target area/population

- **Risk x Risk** approach
  - e.g. poor neighborhood x malnourished
  - e.g. densely populated area x contact investigation

Barangay-wise population density, Metro Manila

![Map of Barangay-wise population density in Metro Manila](map.jpg)
## Risk-by-Risk Table

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<tr>
<th>Target population (venue)</th>
<th>Entire group</th>
<th>HIV</th>
<th>Smokers</th>
<th>Malnourished</th>
<th>TB contact history</th>
<th>Alcoholics</th>
<th>Diabetes</th>
<th>Elderly</th>
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Targeted case finding approaches require specific measures to provide care

- High risk populations requires a tailored service delivery mechanism
  - e.g. Migrants / urban poor
    - highly mobile / high default and transfer
    - Social and financial insecurity
  - e.g. Prisons
    - High co-morbidity including HIV (what if ARV is not available?)
    - Transfer and referral system (release screening?)

- For guidelines:
  - Cases successfully treated is important outcome (not only case finding)
  - Is there any group for which ACF should not be conducted unless the specific support mechanism is not ensured (other than routine DOTS)?

[Graph showing treatment outcome of new smear positive TB by residence status, Beijing, 1997-2002]
Summary

- ACF is potentially a very important TB control strategy in the Region
- Experience shows some positive outcomes in the Region (though limited)
- An interactive tool can facilitate country level targeting, strategy selection and planning
- Risk-by-risk approach can help increase the TB risk and narrowing down the size of the target population (concentration and selection)
  - “Does combining more than two risk factors to identify the target population increase the yield and cost-effectiveness of TB screening?”
- Targeted ACF requires extensive consideration for treatment and care delivery strategies
  - “Does a tailored care mechanism for a specific high risk group (migrant, prisoners, etc) improve TB treatment outcome compare to the routine DOTS programme”