Upgrading the skills of laboratory personnel in low income / high burden countries

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Migration and TB

- Migrants represent nearly 3% of the world population
- Mobile people frequently have difficulty maintaining good health
- TB is of major concern as one third of the world population are infected
- A significant proportion of migrants are travelling from high TB incidence countries to low TB incidence countries

Migrant Screening

- Countries with a long history of immigration include USA, UK, Australia, Canada and New Zealand.
- Medical screening an integral part of the immigration process
  - Infectious diseases including HIV, TB, syphilis
- Different countries use different criteria and tests
- What works well ? What can be improved?

Medical Screening Process

- Chest x-rays adolescents and older
  - First line screening tool
  - Problems with Sensitivity and Specificity
  - It is estimated that approximately 20% of active TB case are missed using chest radiography (Toman 2004)
  - Problems with inter-reader variability
  - Co-morbidity with HIV infection and tuberculosis further diminishes the reliability of chest radiography for the diagnosis of pulmonary tuberculosis (Frieden 2004).

TB Classifications

Class	Chest X-ray Findings / Symptoms	Sputum AFB microscopy
A	Suggestive of active TB or suggestive of inactive TB with signs or symptoms	At least one of the three sputum specimens are positive
B1	Suggestive of active TB or with signs or symptoms of TB	Three smear negative specimens
B2	Suggestive of TB that is inactive and no signs or symptoms of TB	Not required

Laboratory Testing

- Following abnormalities detected on CXR
- Requirements for laboratory testing differ depending on host country
- AFB microscopy x 3 required by USA and UK

- AFB microscopy and culture x 3 required by Australia, NZ and Canada

Problems faced by the laboratory

- Quality of the specimen
- Selection of the specimen for smearing
- Direct vs concentrated microscopy
- The staining method used
- Light vs fluorescence microscopy
- Laboratory workload

Should culture be used?

Advantages

- Detects all prevalent PTB cases
- Allows for early initiation of treatment Class A and B1 patients
- Helps reduces the risk of TB transmission to persons in the host country
- DST can be performed to exclude MDR-TB

Disadvantages

- Requires up to six weeks
- May delay travel plans for applicants
- Technically demanding
- False positive results due to cross contamination

Is screening effective?

- Cohen *et al*. 2005 reports the incidence of tuberculosis among newly arrived United States immigrants from high tuberculosis prevalence countries observed a significantly elevated incidence within the first years following migration
- Why?
- Consider that natural history of TB infection
- Recent exogenous infection
- Reactivation of latent infection due to
  - Peri immigration stress
  - Poor nutrition
- Inadequate case detection
  - Prevalent cases are missed

Is screening effective?

- Maloney *et al*. 2006 in a study of US bound immigrants found screening by AFB microscopy yielded a sensitivity of only ~33% compared with culture
- This suggests that prevalent cases are being missed during laboratory screening and are subsequently reported as incident case upon arrival to the host country

The Australian Situation

- Rates in Australia remained relatively stable at ~5-6 /100,000 pop
- Incidence of TB among foreign born person is 20 times greater than among non-indigenous Australians
- Australian health requirement and health undertaking process for visa for > 3 months
- Examine long term migrants
  - Very few cases within first two years following migration

Do you use screening as a TB case inclusion or exclusion tool?

- If inclusion….
  - Need to ensure that there is a good process of case holding until completion of treatment thereby ensuring TB cases are not lost to follow-up.

Human Resource Development

- Laboratories in resource poor settings screening migrants will suffer from some of the same problems affecting NTP laboratories
- Funds for migration screening are attractive to laboratory Managers BUT…..are the laboratories adequately staffed? Also can these services deplete routine NTP services?
- Need a sustained plan for training technical staff and evaluating performance
- External quality assessment is an essential component for evaluating work performance
- Need to monitor performance of laboratories using laboratory performance indicators

- Finally……..

- The laboratory can often the weakest link for the detection and diagnosis of tuberculosis
- Real need to understand the limitations due to adequate human resources, adequate facilities, adequate workload, appropriate testing
- Policy makers also need to aware of limitations of laboratory screening of tuberculosis using microscopy alone.
- Monitor performance using standard quality indicators