Tuberculosis in the Setting of HIV Infection

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TB/HIV Co-infection

- Describe the epidemiology of TB/HIV coinfection
- Describe the impact of HIV on the natural history of TB
- Describe current guidelines for the diagnosis and treatment of LTBI in the setting of HIV infection
- Explain treatment and management strategies for TB patients with HIV

TB/HIV facts 2015

- Tuberculosis is the most common presenting illness among people living with HIV
- Estimated 1.2 million HIV positive new TB cases globally in 2014.
- TB is the leading cause of death among people living with HIV. In 2015, 35% of HIV deaths were due to TB.
- At least one-third of the 37 million people living with HIV worldwide are infected with latent TB.

Source: World Health Organization

Prevalence of TB in post-mortem studies of HIV-infected adults in resource-limited settings

- Included 36 eligible studies, reporting on 3237 autopsies.
- Overall, TB was the cause of death in 37.2% of adult HIV/AIDS-related deaths.
- Prevalence of TB at autopsy varied markedly: 63.2% for studies in South Asia (n=2); 43.2% in studies in sub-Saharan Africa (n=9), 27.1% in studies in the Americas (n=5) and 12.5% in a single study from East Asia
- TB remained undiagnosed at death in 45.8% of TB cases.


Overall, 32% of TB cases estimated to be co-infected with HIV in the African region, which accounted for 74% of TB cases among people living with HIV worldwide.

WHO, Global TB Report 2015

TB-HIV Co-infected Cases: United States and Minnesota, 2005-2014

TB/HIV Co-infection

- Epidemiology of TB/HIV coinfection
- Effect of HIV on clinical outcome of M. tuberculosis infection
- Clinical presentation/diagnosis of TB disease in persons with HIV
- Treatment of HIV (ART) in patients with TB disease
- Diagnosis and treatment of latent M. tuberculosis infection in persons with HIV
- World Health Organization public health guidelines for HIV/TB

Effect of HIV on outcome of M. tuberculosis infection

- Risk of Developing TB Disease
  - Untreated, 5% of infected persons with normal immunity develop TB in first 1–2 years post infection, another 5% later in life. Thus, about 10% of infected persons with normal immunity will develop TB at some point in life if not treated
  - Persons with weak immunity at increased risk of progressing to TB disease
    - Untreated HIV infection highest risk factor: risk of developing TB disease is 7%–10% each year
  - Therefore, among those infected with M. tb, HIV immune suppression increased the risk of progression to active TB

Prospective study of the risk of TB among intravenous drug users with HIV

Table 2. Incidence of Active Tuberculosis during the Study Period, According to HIV Status and Prior PPD Status.*

<table>
<thead>
<tr>
<th>GROUP</th>
<th>HIV-POSITIVE</th>
<th>HIV-NEGATIVE</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>All study subjects?</td>
<td>8/215 (4)</td>
<td>0/208 (0)</td>
<td>&lt;0.002</td>
</tr>
<tr>
<td>Cases/100 person-years</td>
<td>2.1</td>
<td>0</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>Prior positive PPD test</td>
<td>7/49 (14)</td>
<td>0/62 (0)</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Cases/100 person-years</td>
<td>7.9§</td>
<td>0</td>
<td>&lt;0.005§</td>
</tr>
</tbody>
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Clinical Presentation of TB Disease in Persons with HIV

- Manifestations may depend on level of immune suppression
  - With less severe immune suppression, similar to HIV-negative
    - Lungs primarily affected with typical symptoms
    - CXR often shows cavitation
  - With greater immune suppression, extrapulmonary and miliary involvement more likely
    - Involvement may include lymph nodes, pleura, brain, pericardium, CNS, abdomen
    - Pulmonary TB may be paucibacillary, involve hilar and mediastinal lymph nodes, lack cavitation

Epidemiology of Second sputum smear added

In effect of world

Diagnosis and thus, tuberculosis (culture positive)

Clinical presentation/diagnosis of 126

Symptom screening can

Culture of three

Often the manifestations of
culture is not available in

First

Diagnosis

For HIV

In

Unlike individuals without HIV infection, in whom TB may be a chronic, low grade condition, persons with HIV... almost always experience progression of TB disease, ultimately leading to death in the absence of effective treatment.

Thus, subclinical TB may represent the early stages of the disease that will inevitably progress to overt illness.


Subclinical Disease: TB in Patients with HIV

• HIV-infected patients with TB may frequently have so-called "subclinical" TB. Such disease is not recognized as TB, resulting in delays in diagnosis and treatment.

• Often the manifestations of TB do not become apparent until the patient has initiated ART

• Unlike individuals without HIV infection, in whom TB may be a chronic, low grade condition, persons with HIV... almost always experience progression of TB disease, ultimately leading to death in the absence of effective treatment.

• Thus, subclinical TB may represent the early stages of the disease that will inevitably progress to overt illness.


Consistent with lower prevalence of cavitary disease, HIV + patients with pulmonary TB are smear negative more often than HIV negative

• In Thailand and Vietnam, enrolled people with HIV

• 126 patients with pulmonary TB

• First sputum smear diagnosed 36 (29%; 95% CI, 21–37).

• Second sputum smear added 9 patients (incremental yield, 7%) not diagnosed with the first sputum smear

• Third sputum smear added two patients (incremental yield, 2%) not diagnosed with first two sputum smears

• Culture of three sputum specimens diagnoses most TB cases

Monkongdee et al. Am J Respir Crit Care Med 2009; 180: 903–8

Diagnosis of pulmonary TB in resource-limited settings

• In many resource-limited settings, sputum smear is principal means of detecting TB

• For patients with a low bacillary load, true positive cases can easily be missed

• Culture is not available in many settings. Requires training, biosafety, supervision, financial resources

TB/HIV Co-infection

• Epidemiology of TB/HIV coinfection

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Symptom screen for diagnosis of TB

• Patients with HIV infection in Cambodia, Thailand, Vietnam

• Tuberculosis (culture positive) was diagnosed in 267 patients

• Presence of cough of any duration, fever of any duration, or night sweats lasting 3 or more weeks in the preceding 4 weeks was 93% sensitive and 36% specific for tuberculosis

• Symptom screening can help to prioritize patients for whom further diagnostic work-up is helpful

• Diagnosis in most for whom further w/u indicated will require mycobacterial culture.

World Health Organization guidelines for TB/HIV
Reduce the burden of TB in people living with HIV and initiate early antiretroviral therapy (the Three i’s for HIV/TB)
• Intensify TB case-finding and ensure high quality antituberculosis treatment
• Adults/adolescents living with HIV should be screened for TB with a clinical algorithm; those who report any of the symptoms of current cough, fever, weight loss or night sweats may have active TB and should be evaluated for TB and other diseases
• Children living with HIV who have any of the following symptoms – poor weight gain, fever or current cough or contact history with a TB case – may have TB and should be evaluated for TB and other conditions.

WHO policy on collaborative TB/HIV activities: Guidelines for national programmes and other stakeholders, 2012.

Treatment of TB Disease in HIV-infected Individuals
Treatment of patients with tuberculosis is most successful within a comprehensive case management that addresses social as well as clinical clinical issues, such as:
• Social service support
• Assistance with housing, food, transportation assistance
• referral for treatment of substance abuse, mental health
• Coordination of TB services with other providers, including HIV care
• Incentives are “small rewards” that encourage clients to complete TB treatment by motivating them with something they want or need.
• Enablers help clients overcome barriers to completing their TB treatment.

Treatment of TB and HIV in coinfected patients
• Optimal management of HIV-related TB requires that both infections be addressed; sequential treatment of TB followed by HIV treatment is not recommended
• Co-treatment of HIV and TB is complex because of the adherence demands of multidrug therapy for two infections, drug-drug interactions between the rifamycins and many ARV drugs, overlapping side effect profiles of anti-TB and ARV drugs, and immune reconstitution inflammatory syndrome
• Despite these substantial clinical challenges, co-treatment of HIV-related TB improves survival, decreases risk of additional opportunistic illnesses including TB, can achieve high rates of viral suppression, and may improve TB treatment outcomes
• ART is recommended in all HIV-infected persons with TB

ART and TB treatment: Drug-drug interactions
• Rifamycins have clinically significant interactions with a number of ARV drugs. Most result from the potent induction by the rifamycin of genes (e.g., hepatic cytochrome P450) involved in metabolism and transport of ARV drugs
• Examples: Rifampin:
  • Nevirapine AUC ↓ by >50%
  • ↓ PI exposure (>75%) despite ritonavir boosting
  • Raltegravir AUC ↓ 40%
  • Early studies reported a 26% reduction in efavirenz, but more recent/larger studies in HIV + patients with TB have not shown a significant effect of rifampin on efavirenz exposure
  • All PIs markedly increase serum concentrations of rifabutin

CDC, NIH, HIVMA. Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents, 2016.

ART and TB treatment: Drug-drug interactions
• Preferred cotreatment regimen is rifampin-based TB therapy with an ARV regimen of efavirenz plus two nucleoside(tide) analogues
• Previous recommendations to increase the dose of efavirenz, especially in patients who weigh >60 kg not supported by data, and have disadvantages including inability use simple coformulation of efavirenz, tenofovir, and emtricitabine.
• For patients unable to use NNRTIs, the preferred co-treatment regimen is rifabutin-based TB therapy with an ARV regimen that includes a ritonavir-boosted protease inhibitor
• Dose of rifabutin must be decreased to avoid toxicity. Pending additional data, recommend 150 mg of rifabutin daily (at least during the first 2 months) for patients on a PI ARV regimen

CDC, NIH, HIVMA. Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents, 2016.
**ART and TB treatment: Drug-drug interactions**

- Every effort should be made to include a rifamycin in the TB treatment regimen.
- Clinical experience is minimal for use of rifamycins with newer agents (e.g., integrate inhibitors, CCR5 receptor antagonists, cobicistat, etc.).
- These ARV drugs should be used only when required for ARV potency and in consultation with an expert in this field.
- As new antiretroviral drugs are approved, recommendations will be developed about their use in conjunction with antituberculosis regimens.
- Check with latest guidelines and co-manage with experienced HIV pharmacist.

**ART and TB treatment: Immune Reconstitution Inflammatory Syndrome**

- Inflammatory reaction against a foreign antigen (alive or dead) in patients who have started antiretroviral therapy and who have undergone a reconstitution of their immune responses against this antigen.
- Improved Cell Mediated Immunity detect hidden pathogens which were ignored with deficiency of immunity previously.
- Result in inflammatory process at the area of occult / sub-clinical infections.
- With concurrent antiretroviral therapy, see increase in CD4 count (often low at start) and decrease in plasma viremia.
- May get exaggerated inflammation or atypical inflammatory response, can see worsening of pre existing disease.

**ART and TB Treatment: TB IRIS**

- Systematic review of IRIS in patients starting ART.
- In patients with previously diagnosed AIDS-defining conditions the incidence was 15.7% (9.7–24.5%) for TB.
- Lethality was 3.2% (0.7–9.2%) for tuberculosis.

**ART and TB Treatment: Paradoxical TB IRIS**

- Paradoxical TB-IRIS occurs in patients who are diagnosed with active TB before starting ART.
- Typically, these patients have had clinical improvement on TB treatment before starting ART.
- Unmasking TB-IRIS can occur in patients who have unrecognized TB at the time they start ART.
- TB may have been sub-clinical, minimally symptomatic, or the diagnosis has been missed.

**ART and TB treatment: Paradoxical TB IRIS**

- Within first weeks of ART (sometimes later) new or recurrent symptoms and new, worsening, or recurrent clinical and radiologic features of TB.
- May see hectic fevers, new/worsening lymphadenopathy, and new/worsening pulmonary infiltrates.
- Mortality from paradoxical TB-IRIS is uncommon.
- Life-threatening manifestations include enlarging cerebral tuberculomas, meningitis, pericardial effusions with tamponade, extensive pulmonary involvement with respiratory failure, nodal enlargement causing airway obstruction, and splenic rupture.

**ART and TB Treatment: Paradoxical TB IRIS**

- Most cases self-limiting.
- Many patients require symptomatic therapy: analgesia, antiemetics) and, if significant, anti-inflammatory therapy.
- More severe paradoxical IRIS may require treatment with prednisone to reduce symptoms and lead to radiographic improvement.
- Steroids should be used for TB-IRIS involving the CNS.
- May need needle aspiration of enlarging serous effusions, large tuberculous abscesses, or suppurative lymphadenitis.

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CDC, NIH, HIVMA. Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents, 2016
ART and TB treatment: Unmasking TB IRIS

- Particularly accelerated and inflammatory presentation of TB in the first weeks of ART.
- Common presentation is pulmonary TB presenting with rapid symptom onset and clinical features similar to bacterial pneumonia, with high fever, respiratory distress, and consolidation on CXR
- Focal inflammatory manifestations such as abscesses and lymphadenitis may develop.
- Treatment is standard TB treatment and corticosteroids if the manifestations are life threatening

CXC, NIH, HIVMA. Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents, 2011

When to Start ART in TB Patients

CAMELIA Study:
- TB/HIV patients with <200 CD4+ cells (median=25 cells)
- Assigned to either earlier ART (2 weeks after beginning TB treatment) or later ART (8 weeks after TB treatment)
- Risk of IRIS: 2.5 times greater in 2 week arm
- Risk of death: 18% in 2-week arm and 27% in 8-week arm

Blanco et al. NEJM 2011;365:1471-81

When to Start ART in TB Patients

ACTG5221:
- TB/HIV patients with <250 CD4+ cells (median=77 cells)
- Assigned to earlier ART (within 2 weeks after beginning TB treatment) or later ART (8-12 weeks after TB treatment)
- Risk of IRIS: 11% in early arm vs. 5% in later arm
- New AIDS illness or death: 12.9% in early arm and 16.1% in later arm (p=0.45)

New AIDS illness or death in patients with <50 CD4+ cells: 15.5% in early arm and 26.6% in later arm (p=0.02)

Hayril et al. NEJM 2011;365:1482-91

When to Start ART in TB Patients: Current Recommendations

- ART is recommended in all HIV-infected persons with TB
- For ART-naive patients, with CD4 counts <50 cells/mm³: Initiate ART as soon as possible, but within 2 weeks of starting TB treatment
- For ART-naive patients, with CD4 counts >50 cells/mm³: Initiate ART within 8 weeks of starting TB treatment
- Although increased risk of TB IRIS with earlier ART, mortality risk from this syndrome found to be negligible
- In patients with TB meningitis and low CD4 cell counts, early ART may pose a risk that calls for careful monitoring and consultation with experts.

Antiretroviral therapy to prevent TB

- Systematic review and meta-analysis of studies that analyzed the impact of antiretroviral therapy on the incidence of tuberculosis in adults with HIV infection.
- Antiretroviral therapy is strongly associated with a reduction in the incidence of TB in all baseline CD4 count categories:
  - (1) less than 200 cells/µl (hazard ratio [HR] 0.16)
  - (2) 200 to 350 cells/µl (HR 0.34)
  - (3) greater than 350 cells/µl (HR 0.43)
  - (4) any CD4 count (HR 0.35)

Antiretroviral Therapy Significantly Reduces TB Incidence

High incidence of TB during first 3 months of ART and subsequent rapid decrease.

In resource-limited settings, the risk of TB decreased steeply during the first year of ART and was strongly associated with improving immune status.

Lawn SD, et al, Am J Respir Crit Care Med, 2008;177:680-685

Xpert MTB/RIF assay in HIV patients

- Summarized seven studies of patients infected with HIV
- Median sensitivity of smear microscopy was 52.8% compared with 84.0% with the Xpert MTB/RIF assay.
- Lowest sensitivity in a study in which patients were actively screened for tuberculosis, irrespective of symptoms.
- Sensitivities were higher in studies of outpatients with chronic symptoms and higher still in studies of patients admitted to hospital.
- Sensitivity of the Xpert MTB/RIF assay relates to severity of symptoms, which in turn might reflect mycobacterial load.


Urine lipoarabinomannan assay (LAM)

- Lipopolysaccharide cell-wall component of M. tuberculosis detected in urine of patients with TB
- Meta-analyses of LAM for TB diagnosis showed median pooled sensitivity and specificity of 45% (95% CI: 29%-63%) and 92% (80%-97%) in participants with a CD4 count of ≤100 cells per µL versus 26% and 92% in participants with ≥100 CD4 cells.
- Sensitivity of a combination of LF-LAM and Xpert MTB/RIF was 75%, a 13% increase over Xpert MTB/RIF alone.


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Interpreting the TST Reaction

≥10 mm induration is classified as positive in number of high-risk groups: e.g., recent arrivals from high-prevalence countries; injection drug users; residents of high-risk congregate settings, etc.

≥5 mm induration is classified as positive in
- HIV-infected persons
- Recent contacts of infectious TB
- Persons with fibrotic changes on CXR c/w with prior TB
- Other immunosuppressed patients
- Challenge with HIV infection is development of skin test anergy, especially in patient with greater degrees of immune deficiency
- Other disadvantages: Requires second visit, staffed trained to correctly interpret
Interferon-gamma release assays for the diagnosis of latent TB infection in HIV-infected individuals

- Measure interferon-gamma release after exposure of whole blood or peripheral blood mononuclear cells to Mtb antigens
- Systematic review and meta-analysis conducted:
  - Are IGRAs better than TST at predicting which HIV-infected individuals are at highest risk of progression to active TB?
  - Are IGRAs more sensitive than TST for diagnosis of MTB infection, particularly in HIV-infected individuals with advanced immunosuppression?
- For both questions, we found insufficient evidence to conclude that either test is superior to the other.
- In high-income countries, pooled proportion of positive test results lower for CD4+ <200 cells vs. ≥200 cells:
  - For QFT-GIT difference –4%, 95% CI –7% to –2%
  - For TSPOT, difference –3%, 95% CI –7% to 0%

Cattamanchi et al. JAIDS 2011; 56: 230–238.

U.S. Recommendations for Treatment of Latent Tuberculosis Infection

- HIV-infected individuals who test positive for LTBI but have no evidence of TB disease (and no prior treatment history for active or latent TB) should receive LTBI treatment
- HIV-infected close contacts of anyone who has infectious TB also should receive prophylaxis, regardless of results of screening tests for LTBI
- Notably, for HIV-infected individuals who are anergic and have not had recent contact with anyone with infectious TB, treatment of LTBI is not associated with clinical benefit and is not recommended

CDC, NIH, HIVMA. Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents, 2016


Preventive therapy is recommended for PPD+ HIV-infected individuals who do not have active tuberculosis. In some settings it may not be feasible to perform PPD testing. Under these circumstances the following individuals may still be considered for preventive therapy if they are infected with HIV:

- Those living in populations with a high prevalence of tuberculous infection (estimated to be >30%)
- Health care workers
- Household contacts of TB patients
- Prisoners
- Miners
- Other selected groups at high risk of acquisition or transmission of TB

WHO Policy statement on preventive therapy against tuberculosis in people living with HIV (1998)

2012 WHO Guidelines on Preventive Therapy for TB

- Adults and adolescents living with HIV should be screened with a clinical algorithm; those who do not report any one of the symptoms...are unlikely to have active TB and should be offered IPT
- Tuberculin skin test (TST) is not a requirement for initiating IPT in people living with HIV. People living with HIV who have a positive TST benefit more from IPT; TST can be used where feasible to identify such individuals
- Providing IPT to people living with HIV does not increase the risk of developing isoniazid-resistant TB. Concerns regarding the development of INH resistance should not be a barrier to providing IPT

WHO policy on collaborative TB/HIV activities: Guidelines for national programmes and other stakeholders, 2012.

Diagnosis of Latent Tuberculosis Infection

- Testing for LTBI at the time of HIV diagnosis should be routine, regardless of an individual’s risk of TB exposure.
- Individuals with negative diagnostic tests for LTBI who have advanced HIV infection (CD4 <200) and no indications for initiating empiric LTBI treatment should be retested for LTBI once they start ART and attain a CD4 count ≥200 cells
- Annual testing for LTBI recommended for HIV-infected patients at high risk of repeated or ongoing exposure to active TB.
- In HIV-infected patients, the correlation between TST and IGRAs is poor to moderate.
- In prospective studies, positive results with either TST or IGRA associated with an increased risk of developing TB disease
- Both TST and the FDA-approved IGRAs are appropriate for TB screening in HIV-infected individuals

CDC, NIH, HIVMA. Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents, 2016

U.S. Recommendations for Treatment of Latent Tuberculosis Infection

- Isoniazid for 9 months remains preferred therapy
- Isoniazid should be supplemented with pyridoxine at a dose of 25 mg/day to prevent peripheral neuropathy
- 3-month isoniazid-rifapentine regimen is not recommended for HIV patients receiving ART because of potentially significant drug interactions between rifapentine and some ARV drugs
- 2 months rifampin plus pyrazinamide is not recommended because of the risk of severe and sometimes fatal hepatotoxicity
- LTBI treatment and ART act independently to decrease the risk of TB disease.

CDC, NIH, HIVMA. Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents, 2016
Duration of IPT in TB-endemic areas

- Recommended that for who are living with HIV, have unknown or positive TST status and are unlikely to have active TB should receive at least 6 months of IPT as part of a comprehensive package of HIV care.
- Studies in sub-Saharan Africa suggested that benefit of IPT was lost within 6-18 months after completion of prophylaxis.
- Studies in Africa of TB recurrence after completion of initial treatment in HIV patients found that most recurrences due to reinfection rather than relapse.
- In Botswana, conducted a study comparing 36 months IPT to 6 months IPT.


WHO: 36 month IPT in HIV patients

In resource-constrained settings with high TB incidence and transmission, adults and adolescents living with HIV, who have an unknown or positive tuberculin skin test (TST) status and among whom active TB disease has been safely ruled out, should receive at least 36 months of isoniazid preventive therapy (IPT). IPT should be given to such individuals regardless of whether or not they are receiving ART. IPT should also be given irrespective of the degree of immunosuppression, history of previous TB treatment, and pregnancy.

(Conditional recommendation, low quality of evidence).

WHO recommendation on the provision of 36 months isoniazid preventive therapy to adults and adolescents living with HIV in resource-constrained and high TB- and HIV-prevalence settings (2015)

WHO: 36 month IPT in HIV patients

Remarks: People living with HIV in high TB incidence and transmission settings, regardless of their TST status, benefit more from IPT of 36 months or longer, compared to six-month IPT, with greater protective benefit in those with a positive TST. There is a significant additional benefit from longer-term IPT for those receiving ART. TST is encouraged whenever feasible, but it is not a pre-requisite for IPT. If TST is performed, those with a negative TST should not receive 36 months of IPT. Settings with high TB incidence and transmission should be defined by national authorities, taking into consideration the local epidemiology and transmission of both TB and HIV.

WHO recommendation on the provision of 36 months isoniazid preventive therapy to adults and adolescents living with HIV in resource-constrained and high TB- and HIV-prevalence settings (2015)

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World Health Organization guidelines for TB/HIV

Establish and strengthen the mechanisms for delivering integrated TB and HIV services

1. Set up and strengthen a coordinating body for collaborative TB/HIV activities functional at all levels
2. Determine HIV prevalence among TB patients and TB prevalence among people living with HIV
3. Carry out joint TB/HIV planning to integrate the delivery of TB and HIV services
4. Monitor and evaluate collaborative TB/HIV activities

WHO policy on collaborative TB/HIV activities: Guidelines for national programmes and other stakeholders, 2012.
World Health Organization guidelines for TB/HIV

Reduce the burden of HIV in patients with presumptive and diagnosed TB
1. Provide HIV testing and counselling to patients with presumptive and diagnosed TB
2. Provide HIV prevention interventions for patients with presumptive and diagnosed TB
3. Provide cotrimoxazole preventive therapy for TB patients living with HIV
4. Ensure HIV prevention interventions, treatment and care for TB patients living with HIV
5. Provide antiretroviral therapy for TB patients living with HIV

WHO policy on collaborative TB/HIV activities: Guidelines for national programmes and other stakeholders, 2012.

Ensure control of TB Infection in health-care facilities and congregate settings

Recommendations include:

- HIV programs and TB-control programs should provide managerial direction at national and subnational levels for the implementation of TB infection control in health-care facilities and congregate settings.
- Each health-care and congregate setting should have a TB infection control plan of the facility, preferably included into a general infection control plan, supported by all stakeholders, which includes administrative, environmental and personal protection measures to reduce transmission of TB in health-care and congregate settings, and surveillance of TB disease among workers.

WHO policy on collaborative TB/HIV activities: Guidelines for national programmes and other stakeholders, 2012.

Fighting TB and HIV

“"We cannot win the battle against AIDS if we do not also fight TB. TB is too often a death sentence for people with AIDS.”

Nelson Mandela

WHO policy on collaborative TB/HIV activities: Guidelines for national programmes and other stakeholders, 2012.