TB Comorbidities

Several medical conditions are risk factors for TB and poor TB treatment outcomes. Similarly, TB can complicate course of some diseases. It is therefore important to identify these comorbidities in people diagnosed with TB in order to ensure early diagnosis and improved outcome. When these conditions are highly prevalent in the general population they can be important contributors to the TB burden. Consequently, reducing the prevalence of these conditions can help prevent TB. TB share underlying social determinants with many of these conditions. Addressing the social determinants of health is a shared responsibility across disease programmes and other stakeholders within and beyond the health sector.

TB and HIV

The primary impact of HIV on TB is that the risk of developing TB becomes higher in patients with HIV. Overall, HIV-infected persons have approximately an 8-times greater risk of TB than persons without HIV infection. The risk of TB in HIV-infected persons continues to increase as HIV disease progresses and CD4 cell count decreases. While anti-retroviral treatment can substantially decrease the risk of TB, this risk always remains higher than that in HIV negative individuals. Furthermore, among cured TB survivors with HIV infection, the risk of recurrent TB is also quite high.

Similarly, Tuberculosis is the most common opportunistic infection amongst HIV-infected individuals. It is a major cause of mortality among patients with HIV and poses a risk throughout the course of HIV disease.

The presentation of TB in the HIV-infected patient may vary with degree of immune suppression. The diagnosis of TB in PLHIV can be more difficult and may be confused with other pulmonary or systemic infections. As the HIV disease progresses and the individual become more immune-compromised, the clinical presentation is proportionately more likely to be extra-pulmonary or smear-negative than in HIV-uninfected TB patients. This can result in misdiagnosis or delays in diagnosis, and in turn, higher morbidity and mortality.

It is estimated that there are 2.1 million people living with HIV in India with an estimated adult HIV prevalence of 0.27% (range: 0.2%–0.4%).TB accounts for 25% of deaths among People Living with HIV and AIDS (PLHIV) in India. Although only 5% of incident TB patients are HIV-infected, in absolute terms it means more than 100,000 cases annually, ranks second in the world and accounts for about 10% of the global burden of HIV-associated TB. HIV positivity among PLHIV varies from states /districts in the country, the proportion of HIV positive among TB patients over 10% in high HIV burden states to up to 40% in some high burden districts.

NACP and RNTCP Coordination in India:

To mitigate the effect of dual burden of HIV and TB co-infection, the ministry of Health and Family Welfare, Government of India through its NACO and Central TB Division (Department of Health and Family Welfare) has been undertaking joint collaborative efforts since 2001. While joint HIV/TB activities started with differential strategies based on underlying HIV burden initially, the programme evolved over the years and currently implements uniform HIV/TB collaborative activities across the country. NACP and RNTCP have developed a policy of HIV/TB collaborative interventions based on experience gained during programme implementation in initial years.

The mechanism for collaboration includes coordinated service delivery at field level, and oversight and advisory groups at the district level in the form District Coordination Committee chaired by District Collector. At the state level, a similar mechanism exists in the form of the State Technical Working Group chaired by Director Health Services and State Coordination Committee chaired by Principle Secretary Health. At the National level, TB-HIV coordination committee chaired by Additional Secretary, National AIDS Control Organization [NACO] and technical working group [NTWG] chaired by DDG regularly monitor and provide suggestions on key policy matters related to TB/HIV Collaborative activities. To enable effective coordination, joint trainings, standard recording and reporting, joint monitoring and evaluation and operational research are strategically implemented.

Milestones of TB-HIV collaborative activities in India

- 2001- Basic HIV/TB activities started in six high-HIV burden states.
- 2003 - Pilot for HIV-TB cross-referral in four districts of Maharashtra.
    - Cross-referral started in six HIV high prevalence states.
- 2004 - Cross referral of activities expanded to eight additional states.
- 2005 - Joint training modules developed, joint surveillance initiated.
- 2007- Pilot for Routine referral of TB patients for HIV testing and CPT.
    - National (policy) framework for TB/HIV developed.
- 2008 - National Framework revised.
    - All-India implementation of HIV-TB activities.
    - Intensified Package (IP) rolled out in nine states.
- 2009 - National Framework revised.
    - Intensified Package rolled out in eight more states.
    - Uniform activities at ART centers and ICTCs nationwide for intensified TB case finding and reporting, established.
- 2010 - Intensified package launched in 11 states.
- 2012 - Nationwide coverage achieved.
- 2013 - National Framework for HIV/TB collaborative activities in India developed

National Framework for HIV/TB in India:

Latest revision of National Framework Nov 2013 aimed to incorporate recent policy updates in NACP and RNTCP and align with respective national strategic plan for next 5 year along with recommendations in WHO HIV/TB policy guidelines 2011

The salient features are as below.

1. Emphasis on Integrated TB and HIV services e.g. HIV screening at RNTCP DMC.

2. Focus on early detection and early care:

   a. Early detection of TB in PLHIV:
      i. Early suspicion of TB–symptoms of any duration among PLHIV
      ii. Use of an expanded clinical algorithm for TB screening that relies on presence of four clinical symptoms (current cough, weight loss, fever or night sweats) instead of only cough, to identify patients with presumptive TB
      iii. Strengthen ICF at ART, Link ART centre (LAC) and Targeted intervention projects (TI) for High Risk Group (HRG) specially Injection Drug Users (IDU)
      iv. Offering upfront CBNAAT among presumptive TB cases among PLHIV
      v. Early detection HIV/TB

   b. Enhance HIV testing facilities in settings with lack of co-located HIV and TB testing facilities, by establishing HIV screening services using whole blood finger prick test (WBT)
      i. Strengthen HIV testing of TB patients in high HIV prevalent settings by promoting establishment of Facility Integrated Counselling and Testing Centre(F-ICTC) where DMC exists
      ii. PITCamong patients being evaluated by diagnostic smear microscopy presumptive TB cases in high HIV prevalent settings

   c. Early Care:
      i. Promotion of 'single window delivery services' where in all HIV/TB patients get their TB medications from the ART centres along with ART drugs.
      ii. Strengthened linkage of HIV/TB patients to ART centres through travel support by RNTCP as per NSP (2012-2017) etc.
      iii. ART for HIV infected TB cases irrespective of CD4 count
      iv. Prompt ART initiation- within first 8 weeks of commencing Anti-TB treatment.
      v. Monitoring of timeliness of ART initiation through expanded ART reporting formats

3. Early detection and care of HIV infected Drug Resistant TB patients (DR-TB/HIV):
      i. Strengthen HIV testing in presumptive DR-TB cases (Criteria C)
      ii. Ensure access to culture and drug susceptibility testing for HIV infected TB patients
      iii. Prompt linkage of HIV infected DR-TB cases to ART centres
      iv. Prompt initiation of ART in HIV infected DR-TB cases

4. Prevention of TB among HIV infected adults and children:
      i. Implementation of IPT for all PLHIV (On ART + Pre-ART)
      ii. Strengthen implementation of air borne infection control strategies.

5. Strengthen HIV/TB activities among children and pregnant women

6. Promotion of participation of private, NGO, CBO health facilities and affected communities working with NACP and RNTCP to strengthen HIV/TB collaborative activities.

HIV Screening for TB Patients / Presumptive TB cases-

1. Presumptive / Diagnosed TB patients coming to the ICTCs will be offered counselling and testing as per the norms and standard operating procedures of the National AIDS Control Programme (NACP).
2. All referrals will be recorded in the ICTC counselling register as referrals from RNTCP
3. For patients with HIV positive results, the counselor will link the patient to the nearest ART centre available in the district/state .This will be done by giving a referral form and explaining the patient on how to access the centre. The patient will be given the contact details of the district programme managers for any assistance needed
4. The counsellor will document the HIV status, date of HIV testing and PID number in the RNTCP laboratory form as a feedback to LT of DMC. The counselor will also assist the DMC LT to update the laboratory register with information on HIV status.

Intensified TB case finding (ICF) at ICTCs, ART and Community Support Centres (CSCs)
Intensified TB case finding at HIV care settings is an important strategy for early diagnosis of TB among PLHIV.

ICF at ICTCs
All ICTC clients should be screened by ICTC counsellors for presence of TB symptoms at every encounter (pre, post, or follow-up counselling). Clients who have symptoms or signs, irrespective of their HIV status, should be referred to RNTCP diagnostic and treatment facility located in same institution. Therefore, NACP and RNTCP promote establishing co-located facilities, for better coordination between the two programmes. Hence, as network of HIV testing facilities is being expanded, consideration should be given to establish them at sites, which already have RNTCP, designated microscopy centres (DMC).

The referrals of presumptive TB cases from ICTCs to TB diagnosis facility should be recorded on a line list (**Annexure 12A)** to facilitate exchange of information with RNTCP and track the client through the process of TB diagnosis and initiation of TB treatment. To streamline this process further RNTCP programme staff should stay in touch with ICTC counsellors to complete the exchange of information in time. In addition, ICTC counsellors and RNTCP programme staff participate in monthly HIV/TB coordination meeting at district level to validate line-lists and Monthly HIV/TB reports (**Annexure 12B**) and resolve operational issues if any.

ICF at ART Centres
HIV-infected persons attending ART centres for pre-ART registration have a high prevalence of TB disease (6 to 8%). The incidence of TB among ART clients is also very high, even when on ART. Although ART reduces risk of incident TB, it remains many times higher compared to general population. In addition, HIV-infected clients having undiagnosed or untreated TB may seek care at ART centres and thus exposing other HIV-infected persons to the risk of acquiring TB. Therefore active efforts for intensified TB case finding (ICF) at ART centres is critical for early suspicion and detection of TB, linkage to treatment and thus for prevention of transmission of infection to other clients. The national ART guidelines clearly state that all patients coming to ART centres should be actively screened for opportunistic infections, particularly tuberculosis. All people living with HIV should be regularly screened for four symptoms viz., current cough of any duration, fever of any duration, significant weight loss or drenching night sweats, during every visit to a health facility and every contact with a health-care provider. Those with history of coughing blood and sputum and with any pulmonary abnormality in chest X-ray should also be evaluated for TB. Similarly, children living with HIV who have one or more of the following symptoms – failure to thrive, fever or cough of any duration or history of contact with a TB patient should be evaluated for TB.

Screening for TB is important regardless of whether the PLHIV is receiving IPT or ART. The presumptive TB cases identified at ART centres or Link ART centres should be prioritized and "fast-tracked" for evaluation by SMO/MO to minimize opportunities for airborne transmission of infection to other PLHIV.

PLHIVs suspected to have TB by MO, should be subjected to testing of sputum / appropriate specimen from a relevant extra-pulmonary site by CBNAAT at the nearest facility. CBNAAT is the frontline test for diagnosis of TB among PLHIV. If CBNAAT is not available, arrangements have to be made for collection and transportation of sputum specimen to the nearest CBNAAT site. If CBNAAT linkage is not available, then the patient should be evaluated with microscopy and Chest-X ray on the same day.

Clinically dignosed TB and extra pulmonary TB is more common among people living with HIV and therefore a high level of suspicion is required. In the event of suspicion of Extra Pulmonary TB, the diagnostic algorithm as for HIV negative presumptive EPTB patients may be followed. Similarly, refer to diagnostic algorithm for paediatric pulmonary TB.

Preferably, PLHIVs should be offered TB and HIV diagnostic facility at the same premises as a "one-stop service" in order to reduce diagnostic delay and to link those not having any of the four symptom complex to IPT services.

In addition, the referrals presumptive TB cases should be recorded on an ART centre TB-HIV line list (**Annexure 13 A**) to facilitate coordination with RNTCP programme staff and to track the patient closely through the process of TB diagnosis and TB treatment initiation. It is also crucial that ART Centre staff members attend monthly HIV/TB coordination meeting. The HIV/TB monthly reporting format to be generated at ART centres is incorporated into the ART centre monthly report (CMIS) (**Annexure 13 B**).

Information of all HIV infected TB patients in HIV care should be recorded in the ART centre HIV/TB register (**Annexure 13 C**). These include TB patients detected by ART centre staff as well as those TB patients found HIV infected while on TB treatment and referred to ART centre by the RNTCP. TB-HIV register is an important monitoring tool to track timeliness of initiation of CPT and ART the TB treatment outcome to modify ARV regimens as per guidelines. It is also important that ART centre staff carry this register when they attend monthly HIV/TB coordination meeting to update information on TB treatment outcome from RNTCP staff and share information pertaining to CPT and ART with them for recording into RNTCP TB registers.
PLHIV diagnosed to be suffering from TB are presumptive MDR cases and need to follow the algorithm for diagnosis of drug resistant TB (Refer Section 5).

ICF at Link ART Centres (LAC)
The ICF activity is also implemented at all Link ART plus and Link ART centres in the country. As in ART centres LAC-Plus and LAC should 1) implement ICF using symptom screening on every encounter 2) promptly refer presumptive TB case to RNTCP diagnostic facilities, and 3) refer the patient to ART centre promptly if TB is detected for initiation of ART or modify current ARV regimen. Similar to ART centre, the LAC staff nurse /counsellor should maintain line-list, exchange with local RNTCP staff to seek information on TB diagnosis and treatment and complete the line-list.

The LAC Plus use same line-list format as the ART centre **(Annexure 13 A)** while at LAC the ICTC line-list format is used (since ICTC counsellor runs the LAC) **(Annexure 12A)**. The completed line-list from LAC-plus is merged with ART centre line-list whereas that from LAC is merged into ICTC line-list for the same period and monthly report is generated accordingly. These mechanisms are designed considering operational feasibility but key point is if TB is detected among patients at LAC plus of LAC, they **must be promptly referred to ART centre** for further management.

ICF among HIV high risk groups (HRG)

Operational research conducted in high HIV prevalent states have shown that HRG's like female sex workers (FSW), men having sex with men (MSM), injection drug users (IDU) etc. are more likely to have tuberculosis compared to general population. In addition, it is known that HIV prevalence among the HRG is several times higher than general population. While NACP provides HIV prevention interventions for the HRG through its targeted interventions, the ICF provides an opportunity to provide additional services to this population. This intervention is likely to help in detection HIV/TB cases early and link to care support and treatment. Among the HRG's, IDU have highest HIV prevalence therefore the programmes aim to provide ICF services and prompt linkage to care support and treatment to IDU as a priority.

ICF at Care and support centres:

TB symptom screening based on 4 symptom complex should also be done by counsellors and outreach workers at Care and support centre in collaboration with SACS.

Treatment of HIV-infected TB

Early diagnosis and effective treatment of TB among HIV-infected patients are critical for controlling the disease and minimizing the adverse impact of TB on the course of HIV. Hence, initiation of treatment is very important soon after the diagnosis of TB. Among HIV-infected persons, treatment of TB is same as that in the HIV-negative TB patients.

Anti-TB Treatment of HIV infected TB patients:

- Based on the clinical history and investigation reports ART MO will categorize patients as Rifampicin sensitive/ rifampicin sensitivity status not known/ clinically diagnosed TB cases, prior history of taking Anti-TB drugs (Cat I /Cat II) accordingly and initiate daily anti TB treatment in Fixed Dosage Combination as per RNTCP guidelines at ART Centre itself.

- All HIV-infected TB patients if not tested already should be tested for drug susceptibility before initiation of treatment. Staff nurse will refer the patient to the nearest drug resistant TB centre in coordination with to RNTCP and record the same in the line list as DRTB /Rif resistant patient. PLHIV with drug resistant TB should be managed by DR-TB center in consultation with ART centre.

- The STS of TU where ART Centre / CBNAAT site is located (nodal TU) will link the patient to the concerned TU based on the residence of the patient for TB treatment provision and follow up as per RNTCP guidelines. STS (nodal TU) will also be responsible to get the registration details from the concerned TU. Overall

- Responsibility of this linkage and coordination lies with District HIV –TB and PMDT coordinator.

- TB patients living with HIV infection should receive the same duration of TB treatment with daily regimen as HIV-negative TB patients.

- If drug sensitive TB patient and on second line ART, Rifampicin should be replaced with Rifabutin 300 mg three times a week or 150 mg daily.

- TB Treatment card for these patients will be prepared by staff nurse in duplicate and will be duly signed by medical officer. One copy of the TB treatment card is to be handed over to the patient. Patient will be registered , allotted TB Number and Nikshay ID by STS of the concerned TU as per the RNTCP guidelines within one month and nodal TU will be informed

- Pharmacist will maintain the inventory of stocks of Anti-TB drugs at ART centre. District HIV-TB and PMDT coordinator should ensure availability of adequate stock of Anti-TB drug and logistics in coordination with ART centre, District TB Officer ,District Drug store pharmacist.

- RNTCP will identify local treatment supporter for all HIV –TB co-infected patients. Anti TB treatment will be supervised by the local treatment supporter and any adverse drug reactions should be informed immediately to local medical officer at PHI and ART medical officer.

- Regular follow up of the patients, testing for sputum as per RNTCP Guidelines and adherence to ATT & ART treatment is to be ensured by the treatment supporter, STS, STLS, ART MO. ART Counsellor should ensure proper counselling in all the HIV-TB co-infected patients regarding adherence and possible side effects to ART and ATT.

- A mechanism of ensuring and checking adherence has been instituted by sending a missed call by patient to pre-printed phone numbers hidden behind selected pills after taking dose. As the sequence of hidden numbers cannot be predicted by patients, but are known by the system for each month of medication prescribed, the system offers high confidence that patients who respond correctly have indeed taken their medication.

- PLHIV with drug resistant TB should be managed by DR-TB center in consultation with ART centre. The treatment of HIV positive individual with MDR-TB is the same as for HIV negative patients. However treatment is more difficult and adverse events more common. Due to the increased frequency of adverse drug events, rigorous monitoring in this particular group of patients is required in order to ensure adherence to treatment, early identification and treatment of adverse events and reduce lost to follow up.

Anti-retroviral therapy and co-trimoxazole prophylactic therapy in HIV infected TB patients:

In addition to TB treatment, all HIV-infected TB patients must be provided access to care and support for HIV disease, including co-trimoxozole preventive therapy and antiretroviral therapy. ART reduces TB case fatality rates and the risk of recurrent TB. Co-trimaxazole preventative therapy has been shown to reduce mortality among PLHIV by preventing opportunistic infections.

- **Anti-retroviral therapy** must be offered to all patients with HIV and TB as well as drug-resistant TB, irrespective of CD4 cell-count, as early as possible (after 2 weeks) following initiation of anti-TB treatment. Appropriate arrangements for access to anti-retroviral drugs should be made for patients. However, initiation of treatment for TB should not be delayed.

Table: Initiation of first-line ART in relation to anti-TB therapy

Clinical staging	CD4 cell count (cells/mm3)	Timing of ART in relation to initiation of TB treatment	ART Recommendations
Start ART irrespective of any clinical stage	CD4 count of any value	• Start ATT first • Start ART as soon as TB treatment is tolerated(between2 weeks and 2 months)	Start ART Regimen TLE for patients not on ART. Forpatients already on 1st line ART, ZLN,shift to ZLE & continue ZLE even after ATT is stopped.
Rationale for ART recommendation during TB treatment : In the absence of ART, TB therapy alone does not significantly increase the CD4 cell count. Nor does it significantly decrease the HIV viral load. Thus, CD4 counts measured during active TB are likely to reflect the actual level of immune suppression The use of HAART in patients with TB can lead to a sustained reduction in the HIV viral load. It can also facilitate immunological reconstitution, and decrease AIDS-defining illness and mortality. This benefit is seen across different ranges of CD4 counts			

**The use of the standard 600mg/day dose of EFV is recommended for patients receiving EFV and Rifampicin.*
**In women of child-bearing age, the use of contraceptives should be ascertained because of drug reaction, as and when NNRTIs and Rifampicin are being used*
**Special Attention to be paid for monitoring hepatotoxicity*

Immune reconstitution inflammatory syndrome (IRIS)may occur in up to one-third of patients who have been diagnosed with TB and who have started ART. It typically presents within three months of the initiation of ART but can occur as early as five days. Patients with TB-associated IRIS most commonly present with fever and worsening of pre-existing lymphadenopathy or respiratory disease. The symptoms are similar to the paradoxical reactions seen in immuno-competent patients on ATT, but occur more frequently. Most cases resolve without any intervention and ART can be safely continued. Serious reactions, such as tracheal compression caused by massive adenopathy or respiratory difficulty, may occur. Therapy may require the use of corticosteroids.

First Line ART for HIV-TB

TENOFOVIR 300mg + LAMIVUDINE 300 mg + EFAVIRENZ 600 mg (FDC)		
Regimen	Tenofovir + Lamivudine + Efavirenz	All new co-infected patients should be initiated on FDC of TLE single pill based regimen irrespective of HB level/ CD4 count. Those patients who are already on ART on ZLN regimen at the time of TB diagnosis need to be changed to regimen ZL+E at the initiation of ATT due to interaction of ATT & NVP. Such patients will not be changed from EVF to NVP after ATT is completed and will continue on ZLE regimen. There is no change of regimen for patients who are already on ZLE at the time of TB diagnosis & treatment

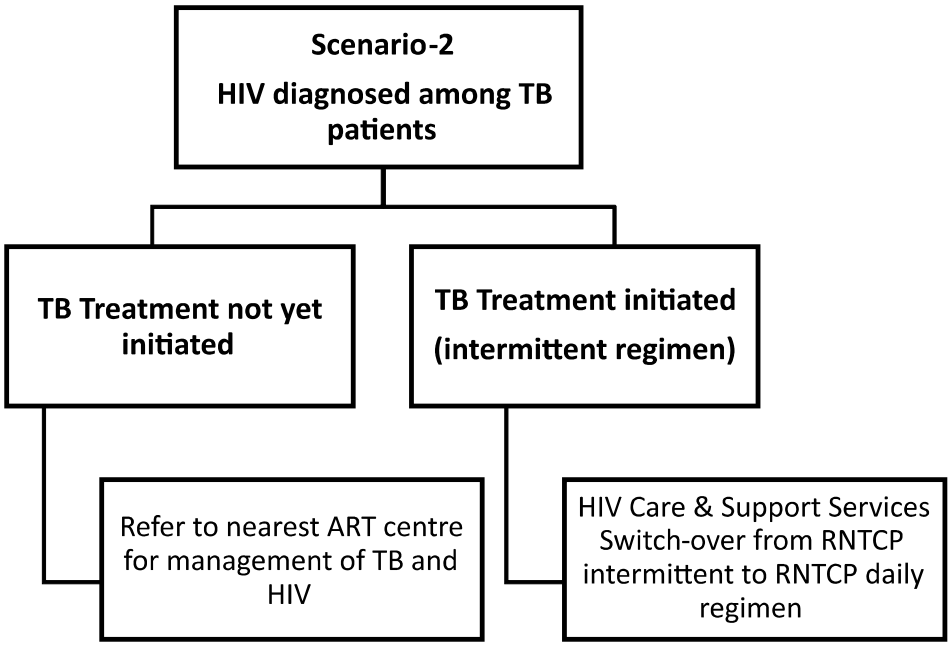
Second Line ART for HIV-TB:
The following regimens are available under the National Programme currently for second line ART:
Tenofovir + Lamivudine + PI (Atazanavir / ritonavir or Lopinavir / Ritonavir)
Zidovudine + Lamivuidne+ PI (Atazanavir / ritonavir or Lopinavir / Ritonavir)
Stavudine+ Lamivudine + PI (Atazanavir / ritonavir or Lopinavir / Ritonavir)
Abacavir+ Lamivudine+ PI (Atazanavir / ritonavir or Lopinavir / Ritonavir)
Rifampicin alters the metabolism of Protease Inhibitors, including Atazanavir and Ritonavir and reduces their effectiveness in standard doses

Initiating ART (Anti-Retroviral Therapy) in patients with DR- TB

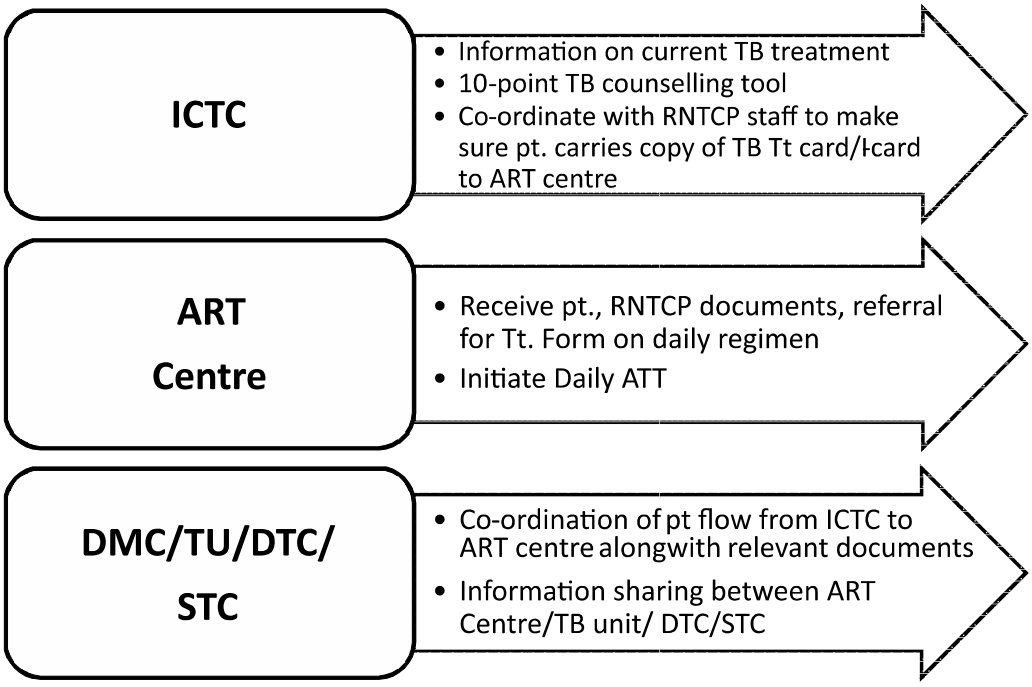
- The use of ART in HIV infected patients with TB improves survival for both drug resistant and susceptible disease. However HIV infected MDR patients without the benefit of ART may experience mortality rates exceeding 90%. The likelihood of adverse effects could compromise the treatment of HIV or MDR TB if both treatments are started simultaneously. On the other hand undue delay in starting ART could result in significant risk of HIV related death amongst MDR patients.
- For patients who are already on ART at the time of DR-TB diagnosis be continued on ART when MDR-TB therapy is initiated. Occasionally, patients with HIV-related TB may experience a temporary exacerbation of symptoms, signs or radiographic manifestations of TB after beginning TB treatment. This paradoxical reaction occurs in HIV-infected patients with active TB and is thought to be a result of immune restitution due to the simultaneous administration of antiretroviral and tuberculosis medication (IRIS Syndrome).

Timing of referral to ART Centre

The following algorithm can be followed.



switch over from intermittent to daily regimen steps



- Patients who are not yet on ART should be provided with a referral to the ART centre immediately on identification as an HIV-infected TB patient. However, these patients (especially microbiologically confirmed pulmonary TB) should be counselled to attend the ART centre after at-least 2 weeks of anti-TB treatment have been completed, so that the risk of TB transmission to others is lessened.

- TB treatment should never be delayed, but it should be stressed to the patient to attend the ART centre as soon as possible, without delay. Patients who are on ART from a source other than NACO should be referred to an NACO ART Centre if they are willing or to their existing ART providers with information on TB treatment initiation otherwise.

Process at ART Centre

1. In view of advanced clinical stage of HIV disease, HIV-infected TB patients are to be evaluated for ART on priority (Fast-tracked). HIV-infected TB patients should be prioritized for CD4 testing.

2. The ART Centre Staff Nurse are to record patients' TB notification number and name of referring unit in the pre-ART register (along with 'entry point code') and ART- register.

3. The ART Centre Staff Nurses are to record the patient in the "ART Centre TB-HIV Register", and include information on whether or not ART was initiated.

4. If the HIV-infected TB patient is initiated on ART, they would also continue their CPT from the ART Centre.

5. The ART Centre staffs are expected to provide feedback to the referring physician. In particular, the ART Centre staff should communicate when they have assumed responsibility for CPT provision, so that the PHI Medical Officer can know if CPT is to be discontinued from that source.

6. The daily anti-TB regimen will be dispensed from ART centre on monthly basis to the patient by ART centre pharmacist.

Provision of Co-trimoxazole Prophylaxis Therapy (CPT) to HIV-Infected TB patients:

- Co-trimoxazole is a fixed dose combination of sulfamethoxazole and trimethoprim; it is a broad spectrum antibiotic that targets a range of gram-positive and gram-negative organisms, fungi, and protozoa. Co-trimoxazoleis given routinely for the prevention of opportunistic infections in HIV-infected persons; this strategy is called **Cotrimoxazole prophylaxis therapy.** CPT reduces morbidity and mortality of HIV-infected patients in general and HIV-infected TB patients in particular.Additional points to remember include:

- Dose for prophylaxis for adults (> 14 years old) and > 30 kg body weight): 960 mg (800 mg sulfamethoxazole + 160 mg trimethoprim) daily.

- For children and very low-weight adults (<30 kg), CPT for these patients is managed by ART centres as per separate protocol.

- CPT is provided to patients in monthly pouches.

- CPT is self-administered by the patient on a daily basis, and not under direct observation.

- CPT can be taken alongside anti-tuberculosis treatment (ATT) and ART. Many patients who are eligible for ART would also have CPT continued at ART center.

- Pregnant patients are also eligible, regardless of foetus gestational age.

- Patients should have no history of a serious drug allergy to sulpha drugs or glucose-6 phosphate dehydrogenase (G6PD) deficiency.

Isoniazid Preventive Therapy (IPT) For PLHIVs

IPT is one of the 3 I's globally recommended for prevention of incident TB among HIV infected individuals. Isoniazid is the most effective bactericidal, anti-TB drug available at currently. While it protects against progression of latent TB infection to active disease i.e. reactivation, it also prevents TB reinfection post the exposure to an open case of TB. In 2011 the World Health Organization (WHO) issued specific recommendations regarding the use of IPT in its guidelines on "Intensified TB case finding and isoniazid preventive therapy for people living with HIV in resource constrained settings". The key recommendations included the following:

a) Adults and adolescents living with HIV should be screened for TB with a clinical algorithm and those who do not report any one of the symptoms of current cough, fever, weight loss or night sweats are unlikely to have active TB and should be offered IPT. The guideline group strongly recommend use of Isoniazid 300 mg once daily for 6 months, in adult and adolescents,
b) Children living with HIV who do not have poor weight gain, fever or current cough are unlikely to have active TB
c) Children living with HIV who have any one of above symptoms may have TB and should be evaluated for TB and other conditions. If evaluation shows no TB, such children should be offered IPT regardless of their age.
d) Children living with HIV who are more than 12 months of age and who are unlikely to have active TB on symptom-based screening, and have no contact with a TB case should receive six months of IPT (10 mg/kg/ day) as part of a comprehensive package of HIV prevention and care services
e) All children living with HIV who have successfully completed treatment for TB disease should receive INH for an additional six months
f) Although IPT is more effective among Tuberculin Skin Test positive individuals (TST), it is not a requirement for initiating IPT intervention among the PLHIV considering difficulty in logistics and administration of the TST,
g) Providing IPT to people living with HIV does not increase risk of developing isoniazid (INH) resistant TB later. Therefore, concerns regarding development of INH resistance should not be a barrier to providing IPT

Steps in Provision of Isoniazid Preventive Therapy (IPT): The IPT provision involves following steps:

a) TB symptom screening at ART centre /Link ART-Plus and Link ART centres
b) Investigations for diagnosis of TB, if found symptomatic
c) If found Asymptomatic, assessment for the eligibility of Isoniazid Preventive therapy
d) If found eligible, initiation of IPT and Registration in IPT register maintained at the Nodal ART centre
e) Monthly collection of Isoniazid
f) Systematic recording and reporting
g) Continued TB symptom screening on each follow-up visits and reconsideration of IPT if symptoms develop

Monthly collection of Isoniazid: All eligible patients are to be initiated on IPT. The regimen prescribed are as below:

a) Adult and Adolescent: Isoniazid 300mg +Pyridoxine 50mg (Vitamin B6) per day for 6 months
b) Children above 12 months: Isoniazid 10mg/kg +Pyridoxine25 mg (Vitamin B6) per day for 6 months

The strategy for monthly collection of Isoniazid + Pyridoxine is as follows:

a) Patients on ART monthly collection from the ART centre, LAC-Plus or LAC along with monthly collection of the ART

b) Patients in pre-ART care visit the ART centre only once in six months. These patients may collect the monthly Isoniazid/ Pyridoxine packet from the designated stand-alone ICTC.

Systematic recording and reporting

All events in the cascade of IPT implementation including symptom screening at all contacts, IPT eligibility assessment, investigations, and the compliance with regimen are to be systematically recorded and reported.

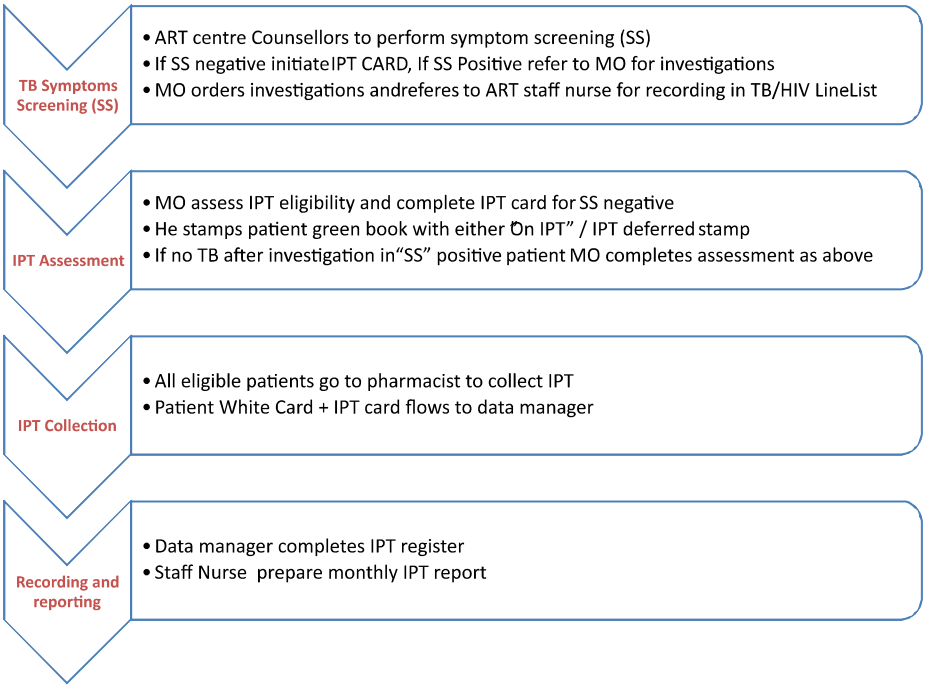
Mechanism of IPT implementation

The ART centre counsellor, staff nurse is to perform TB symptom screening (SS) among all the PLHIV attending the ART centre. If the SS is found negative, an IPT card is initiated, if the patient is found to be SS positive, s/he is referred to the ART centre Medical Officer for further opinion and investigations to rule out active TB disease. The MO prescribes the investigations and refers the patient to the ART centre staff nurse for inclusion in the TB/HIV Line-List

In rest of the patients, the MO undertakes assessment for eligibility of the patient for IPT and also completes the IPT card. He further stamps patient green book with either "On IPT" or IPT deferred stamp based on the situation. Also in patients found not suffering from TB after the investigations the MO undertakes the assessment as above.

All patients found to be eligible for IPT are referred to the pharmacist for collection of drugs. Concurrently the MO ensures that the Patients White Card and the IPT card are sent to the ART centre data manager so that the IPT register is updated. The data manager in turn updates the IPT register and Staff Nurse later prepares the monthly IPT report based on this register. This flow of patient and information is depicted pictorially in **Figure as follows.**

Figure: Mechanism of IPT implementation



TB and diabetes

As a consequence of urbanization as well as social and economic development, there has been a rapidly growing epidemic of Diabetes Mellitus (DM). India has second largest number of diabetic people in the world. As per recent estimates, there are around 66 million DM cases, with a further 77 million people having impaired glucose tolerance.

People with a weak immune system, as a result of chronic diseases such as diabetes, are at a higher risk of progressing from latent to active TB. Hence, people with diabetes have a 2-3 times higher risk of TB compared to people without diabetes.

- About 10% of TB cases globally are linked to diabetes.
- A large proportion of people with diabetes as well as TB is not diagnosed, or is diagnosed too late. Early detection can help improve care and control of both diseases.
- DM can lengthen the time to sputum culture conversion and theoretically this could lead to the development of drug resistance if a 4-drug regimen in the intensive phase of therapy is changed after 2 months to a 2-drug regimen in the presence of culture-positive TB.
- People with diabetes who are diagnosed with TB have a higher risk of death during TB treatment and a higher risk of TB relapse after completing treatment.
- DM is complicated by the presence of infectious diseases, including TB.
- It has been argued that good glycemic control in TB patients can improve treatment outcomes
- The precise biological mechanisms that result in this interaction between Diabetes and TB are still not clear. Epidemiological models have shown that DM accounts for 20% of smear-positive pulmonary TBand recent analyses have indicated that the increase in DM prevalence in India has been an important obstacle to reducing TB incidence in the country

National framework for joint TB- DM collaborative activities

The overall purpose is to articulate the national strategy for TB-Diabetes Mellitus Collaborative Activities between RNTCP and NPCDCS so as to ensure reduction of TB and Diabetes in India. Following strategy is proposed for collaboration between NPCDCS and RNTCP

1. Establishing joint planning and review committee for collaboration at National, State and District levels.
2. Establishment of service delivery protocols that address joint activities is as follows:

    a. Activities to improve diagnosis and management of Diabetes among TB patients:
    - Screening of all registered TB patients for DM
    - Ensuring DM management among TB patients

    b. Activities to improve diagnosis and management of TB among diabetic patients:
    - Intensified detection of active TB disease among DM patients
    - Ensuring TB infection control measures in health care settings where DM is managed
    - Ensuring TB treatment and management in comorbid patients

3. Joint monitoring and evaluation with standardized reporting shared between NPCDCS and RNTCP
4. Joint training of key programme and field staff in Diabetes/TB activities
5. Awareness and IEC activities
6. Operational research to strengthen implementation of DM/TB Collaborative Activities

Mechanisms for collaboration between RNTCP and NPCDCS

Mechanism for collaboration comprise at the National level, aNational TB-DM Co-ordination Committee (NCC) of key officials from NPCDCS and CTD, experts from WHO, national institutes and civil society; at the Stated level, State Coordination Committee on TB- DM, chaired by MD National Health Mission and at the district level, District Coordination Committee (DCC) under the chairmanship of District Collector. States may create Coordination committee on TB-Comorbidities and sub-committees (TB-DM, TB-Tobacco, TB-Alcohol) etc under the SCC for ease of functioning. Alternatively states may start with a separate committee till the systems are set and later on can be merged with the "one" body. These committees will ensure smooth coordination and oversight the collaborative activities.

Screening Intervention and Diagnosis of Diabetes among TB patients

- All TB patients who have been diagnosed and registered under RNTCP will be referred for screening for Diabetes. Referral of TB patients for screening for DM and its recording & reporting is responsibility of the Peripheral Health Institutions (PHI) where TB treatment is initiated.
- The screening for DM will follow the guidelines stipulated by NPCDCS in India. Those guidelines stipulate that fasting blood glucose (FBG) be carried out using a finger prick and glucometer with cut-off thresholds in line with those recommended by the NPCDCS.
- Screening TB patients for DM should be conducted as early as possible after diagnosis of TB; but can be done at any time during the course of TB treatment. Because of the difficulties in getting TB patients to first come to the clinic in a fasting state, TB patients will be initially screened with a random blood glucose (RBG) using a glucometer. If the RBG is less than 140 mg/dl, this is a normal result and no further tests need be carried out. If the RBG is at or greater than 140 mg/dl, this might indicate an abnormal glucose state and there is a possibility of DM. The patient will be asked to return in a fasting state, and a fasting blood glucose (FBG) will be carried out. FBG value at or greater than 126 mg/dl indicates DM.The criteria for diagnosing Diabetes will be as follows.

Diagnosis	Fasting Glucose (mg/dl)	2-hour Post-Glucose Load (mg/dl)
Diabetes Mellitus	>=126	>=200
Impaired Glucose Tolerance	<110	>140 to <200
Impaired Fasting Glucose	>=110 to <126	

- Criteria for suspected Diabetes case is reading of 140 mg/dl for Random Blood Glucose by glucostrip. The suspected case needs to undergo Fasting Blood Glucose test and Post Prandial tests to confirm diabetes
- The blood glucose testing will be done by a person designated and trained for the purpose at every peripheral health institution (PHI). Though, this would vary from site to site the following general principles would apply. Wherever, NPCDCS is being implemented, the Auxiliary Nurse Midwife (ANM) has been trained to use glucometer and screen people for DM. In case this mechanism is not available, the laboratory technician working in the PHI will be trained to do the test. If a PHI does not have a laboratory technician, then either the staff Nurse or any other staff designated by the MO-PHI will be trained to do the test.

Linkage of TB patients with DM for Diabetes care and management –

All Diabetic TB patients should be linked for diabetic care. In the districts where NPCDCS is being implemented, TB patients with DM or with a FBG at or higher than 126 mg/dl will be referred to diabetes care using a referral form for definite diagnosis and management. A referral and feedback mechanism will be developed to enable timely exchange of information. Good cooperation and collaboration will need to be developed between the two sets of staff working in the different service areas.

- At districts where NPCDCS is not implemented, TB patients should be referred to the nearest healthcare facility for further diagnosis and management of TB-DM comorbidity.
- TB patients diagnosed with Diabetes should receive the same duration of TB treatment with daily regimen as non- Diabetic TB patients.

Screening and referral of Diabetic patients for TB

- Four-symptom complex screening for active TB in Diabetes patients is to be done. Screening is expected to be carried out every time the patient visits the DM clinic. Patients will be asked whether they are on TB treatment, and if not, they would be screened for four-symptom complex, i.e.Cough of any duration, Fever, Weight loss, Night sweat.
- The Screening results for Diabetes are to be recorded in the patient NPCDCS register
- NCD clinic will implement basic infection measures as stipulated in RNTCP guidelines

Linkage of Diabetic patients with TB for TB case management-

On screening, patients with one or more symptoms will be referred to nearest diagnostic facility for diagnosis of TB.A referral and feedback mechanism will be developed to enable timely exchange of information. The patients diagnosed for TB would be initiated on TB treatment as per management guidelines stipulated in RNTCP.

TB and nutrition

Under nutrition is considered as one of the risk factors in the development of TB, since under nutrition is known to adversely affect the immune system. Still, there remains a question as to whether malnutrition predisposes to tuberculosis, or whether it is a consequence of the disease. There is as yet little evidence showing that additional nutrition support improves TB-specific outcomes, but low body mass index as well as lack of adequate weight gain during TB treatment are associated with an increased risk of TB relapse and death.

The basic recommendations to address nutritional needs of TB patients are discussed below:

1. Conducting an initial nutrition assessment of TB patients with further monitoring;
2. Providing ongoing counselling for patients on their nutritional status; Diet for TB patients starting treatment should include: cereals (maize, rice, sorghum, millets, etc.); pulses (peas, beans, lentils, etc.); oil; sugar, salt; animal products (canned fish, beef and cheese, dried fish); and dried skimmed milk.
3. Management of severe acute malnutrition should be treated according to national guidelines and WHO recommendations;
4. Management of moderate under nutrition for TB patients who fail to regain normal Body Mass Index (BMI) after two months of TB treatment or appear to lose weight during TB treatment should be evaluated for a proper treatment adherence and other comorbidities. If indicated, these patients should be provided with locally available nutrient- rich or fortified supplementary foods. Special categories of TB patients such as :
    - Children who are less than 5 years of age should be managed as any other children with moderate under nutrition. Pregnant women with active TB, patients with MDR TB should be provided with locally available nutrient- rich or fortified supplementary foods.

- Micronutrient supplementation for all pregnant women as well as lactating women with active TB. These women should be provided with iron and folic acid and other vitamin and minerals to complement their maternal micronutrient needs. In situations when calcium intake is low, calcium supplementation is recommended as part of antenatal care.

The Guidelines on Nutritional assessment and supplementation for the TB patients in India are being prepared so that the programme can adapt the basic principles of nutrition for better outcomes.

Under nutrition and underlying food insecurity are among the most important determinants of TB. Improving nutritional status at population level is important for TB prevention. This should be part of broader actions on social determinants. All efforts should be made to link TB patients for the nutritional support. It can be through the existing public distribution system, local self-government or NGO or donor agencies or through corporate sector under Corporate Social Responsibility (CSR).

Management of severe acute malnutrition: Children below 5 years, School-age children and adolescents (5 to 19 years), and adults, including pregnant and lactating women, with active TB and severe acute malnutrition should be managed for severe acute malnutrition.

TB and tobacco

India is the second largest consumer and the third largest producer of tobacco in the world(FAO, 2005). Nearly one million Indians die from tobacco use every year, which is much more than combined mortality resulting from HIV/AIDS, TB and Malaria. As per Global Adult Tobacco Survey, (GATS 2010, a household survey of persons 15 years of age and above) there are 275 million adult tobacco users in India. It is estimated that more than one- third (35%) of adults in India use tobacco in some form or the other. The prevalence of smokeless tobacco use (26%) is almost twice that of the prevalence of smoking tobacco (14%).

Tobacco smoke contains toxic chemicals which cause disturbances in the bronchial surface of the lung. It also weakens the immunity of the patient to fight with the TB bacteria.
The following evidence emerges from several studies conducted to look at the association of TB and tobacco in India:

- Almost 38% of TB deaths are associated with the use of tobacco.
- Prevalence of TB is 3 times as high among ever-smokers as compared to that of among never-smokers.
- Mortality from TB is 3 to 4 times as high among ever-smokers as compared to that among never-smokers.
- Smoking contributes to half the male deaths in 25-69 age groups from TB in India.

Exposure to tobacco smoke has also been found to affect TB in the following ways :

- Increase the risk of tuberculous infection and the risk of developing TB
- Affect clinical manifestations and increase risk of relapse among TB patients
- Affect microbiological conversion (sputum smear or culture) and outcome of treatment in TB patients
- Increase tuberculosis mortality and drug resistance to anti–tubercular drugs

Integrating Brief Advice for Tobacco Cessation

- When a patient gets registered as a tuberculosis case, the status of tobacco use is enquired.
- The information will be recorded in the TB treatment card in front portion using stamp
- If the TB patient is a smoker or tobacco user, he/she is offered 'Brief Advice' to quit tobacco used based on 5As and 5 Rs model
- The patient is assessed at every visit for follow up for TB and the status of tobacco use or quitting. At the end of treatment, his/her status of tobacco use is recorded in treatment card.
- If the patient has not quit tobacco use, he/she will be referred to the nearest Tobacco Cessation Clinic (TCC) or Quit line or m- cessation initiative.
- The information recorded in treatment card will be sent through the existing HMIS under RNTCP

Brief advice for quitting tobacco use consists of 5 'A's

1. **Ask** the patient if he/she is a tobacco user, during the course of every visit.
2. Briefly **Advise**against continuing tobacco use and link the current condition/ailment to continued tobacco use, where possible. Eg, “Quitting smoking/tobacco use would improve your health and will aid in early recovery from illness.”
3. Then **Assess** readiness to quit by asking the patient whether he or she is ready to quit tobacco use at this time. Eg, “How recently have you thought about quitting tobacco?” If the patient appears ready to change (quit), next steps are:
4. **Assist** the tobacco user in making a quit plan.
5. **Arrange** for follow-up by setting the next contact date.

If the tobacco user is not yet thinking about quitting tobacco use, the doctor/counsellor/treatment supporter will promote greater awareness of the **Relevance** to the patient of the advice to quit, the **Risks** of tobacco use and the **Rewards** (benefits) of quitting. Many tobacco users are largely unaware of the potential harm that continued tobacco use can do to them. If the patient is not ready to quit, the doctor/ counsellor/treatment supporter must not push the patient. People usually need time to change the mindset. If the patient is at least thinking about quitting, the doctor/ counsellor/treatment supporter can find out the patients' **Roadblocks** to quitting and help the patient see ways to overcome these. This process will assist the patient to get ready for quitting the tobacco use, without being forceful.

The 5 R's are :

- **Relevance** of quitting
- **Risks** of continuing
- **Rewards** of quitting
- **Roadblocks** to quitting
- **Repeat** at each visit

Awareness and IEC

- All the DOTS centre /Clinics will be made tobacco free
- IEC material will be displayed at TUs, DMCs and Tobacco Cessation Clinics.
- DMCs and TUs will display IEC material about the hazards of tobacco use, along with the brief advice.
- Tobacco Cessation Clinics will display hygiene and TB awareness related materials.
- Awareness building efforts will be done at both units for patients and staff.
- Sensitisation of all stakeholders (partners, policy-makers and administrators) will be done on regularly basis.
- Every effort will be made by both the programme divisions to sensitise the community about the ill effects of TB and tobacco use

Recording & reporting- Information on tobacco usage and its status is captured in treatment card.

Involvement of National Tobacco Control Programme in tuberculosis control

For enhancing active screening of TB patients through NTCP, the following process is indicated:

- Screening of four symptoms of active TB among tobacco users registered at the District TCC clinic and NCD Clinic at CHC- cough, fever, night sweat and weight loss
- Quit line established for tobacco cessation advice to conduct follow up of comorbid patients (TB patients with tobacco use) registered as TB cured, to identify TB relapse cases
- m-cessation initiatives to include TB-screening symptoms in cessation modules to identify active TB cases in people registered for tobacco cessation
- Ensure implementation of infection control guidelines in TCC Clinics
- Tobacco training modules prepared for teachers to include TB symptoms for increasing awareness among children and young adults

TB & Silicosis

Occupational high-risk group: Although reliable statistics are not available in India, it is known that thousands of workers and local residents are exposed to hazardous silica levels during stone crushing operations. Studies have shown increased morbidity and mortality rates among stone crushing mill workers from silicosis, lung cancer, and other lung diseases. Several other occupations also increase risk for tuberculosis including coal and other mining, tobacco (bidi rolling) and carpet weaving. Vulnerable and socially marginalised groups including tribal communities, children and migrant population are often used in these industries and do not have access to routine health services.

The RNTCP is in process of engaging with the Ministry of Labour and Mining to identify high priority districts with stone crushing units / mining industry. The specific guidelines will be developed to support persons with an occupational risk for TB and provide access, diagnosis and treatment services from the programme.

Human Resource Management

Most of the success that RNTCP has achieved can be attributed to its team of dedicated, hard-working and knowledgeable workers. Being under the overall umbrella of NHM, the HR policy and practice is mostly governed by the State NHM setup. The Central TB Division supplements this by provisioning contractual staff at strategic positions of the programme network, developing terms of reference for hiring of these staff and formulating standardized training material for creating a uniform knowledge base among workers. Apart from general health system staff, RNTCP has provisioned dedicated programme staff at various levels. The human resource structure given in next page enumerates key RNTCP positions at various levels.

Apart from these RNTCP positions, the States have been given the flexibility to create new structures and positions under their own health society mechanisms. Detailed terms of reference of these staff is provided at www.tbcindia.gov.in

Hiring of these staff is done by respective State/District Health Societies (other than National level positions). The compensation package for RNTCP contractual staff has to be decided by respective States, based on State specific situation, Job contents, Job responsibilities, and compensation for similar positions in other programmes under National Health Mission. Terms of reference of staff will be as per the programmatic guidelines.

RNTCP has adapted a cascading methodology to train its Staff, with National institutes and NRLs being involved as centres for training the trainers (STO, STDC Staff, IRL Staff, DTO, Medical College faculty, MO-STC -, etc.) on various components of the programme. These trainers come back and train the relevant cadre. The State TB Training and Demonstration Centres (STDCs) have been playing a major role in imparting State level RNTCP trainings. The MO-TCs and supervisory staff (STS, STLS) are trained at the STDCs who go on to train Treatment Supporters and lab technicians, respectively, at the district/Block/TB Unit level. DTOs with support of MO-TCs are entrusted with the responsibility of training the Medical Officers at district level.

The entire training process is reported under RNTCP programme management activities and closely monitored by National/ State / District officials.

Human Resource Structure

National Institutes

NTI Bengaluru - (TB Specialist, HR Consultant, Research Officer - IT, Documentation Assistant, Junior Epidemiologist, Sr. Microbiologist, Sociologist)

NITRD Delhi (NRL Staff)

NIRT Chennai (NRL Staff)

JaLMA Agra (NRL Staff)

Central TB Division (CTD)

Technical Officers, DEO, SA, Statistician, Data Analyst, Network Administrator, Administrative, Finance and Supply Chain Management Staff

National Reference Laboratories(NRL)

Consultant Microbiologist,

Senior LT

State TB Training and Demonstration Centre (STDC)

Microbiologist - EQA

State TB Cell

Epidemiologist, MO-STC, TB-HIV Co-ordinator, DRTB Co-ordinator, State PPM Co-ordinator, ACSM Officer, Accounts Oficer, Technical Officer-PSM, Treatment Monitor, SA, DEO-STC, DEO-STF, Driver

Intermediate Reference Laboratory (IRL) / CDST Lab

Microbiologist C&DST lab, Sr Lab Tech., DEO

State Drug Store (SDS)

Pharmacist cum Storekeeper, Store Assistant

District TB Centre (DTC)

MO-DTC, MO-Medical College, Sr MO-DRTB Centre, District Program Co-ordinator, District PPM Co-ordinator, District PMDT-TB-HIV Co-ordinator, DEO, Accountant, Driver

Drug Resistant TB Centre (DRTB Centre)

MO-DR-TB Centre, Counsellor, Statistical Assistant

Tuberculosis Unit

Senior Treatment Supervisor (STS), Senior TB Lab Supervisor (STLS),TBHV

Designated Microscopy Centre (DMC)

RNTCP LT/Sputum Microscopist

PHI

Treatment supporter

Capacity building

Capacity building is based on standardized modules which elaborate the technical and management components of the program. Special areas like pediatric TB, Drug resistant TB, TB with co-morbidities, Extra-pulmonary and other serious forms of TB, PPM, IPC, ACSM, SME etc are covered in these modules and also detailed as annexures to the main modules. Various categories of HR are trained/sensitized with the concise forms of these modules.The pharmacists, staff nurses, ANM, MPW, MPHS, Community volunteers are all trained with the same module for MPWs.

The customized modules for programme officials and staff, PPs,NGO functionaries, medical college faculties which include non-practicing TB teachers, non-practicing policy teachers, general practitioners, specialists, post graduates, researchers and professional associations are being developed using the advancement in ICT through capsular online e-training.The courses for each HR category ranging from the national policy makers and program managers to the community volunteers and patients' peer group are compiled based on their TOR and Job Responsibilities with clear focus on development of necessary skills to perform the tasks for each type of trainee. The curriculum matrix thus designed is available on www.tbcindia.gov.in

Training schedule

Induction training: Initial training before assuming the responsibilities of the programme

Update training: Newer initiatives or changes in the policy of the programme are to be conveyed to the health personnel

Re-training / refresher training: Based on training needs of the identified personnel focused on specific deficits of knowledge or skills

For duration and content of training for each cadre the matrix of training courses (with defined content) is to be used for need based scheduling of training which is placed on **www.tbcindia.gov.in** under HRD section. The first step for planning of each training and retraining is periodic training needs assessment.

Procurement & supply chain management

An uninterrupted supply of good quality Anti TB Medicines is an essential component of DOTS strategy under RNTCP. Managing the supply chain in a programme requires continuous monitoring at all levels.

Procurement

At Centre level – Anti-TB drugs, Binocular microscopes, LED Fluorescence microscope, CBNAAT equipment, CBNAAT cartridges, LPA, Solid and Liquid culture lab equipment and consumables, PDA/Tablet computers, barcode printers and scanners

At State / District level – Laboratory consumables and equipment, computers, vehicles, printing materials, IEC materials, PPD vials, refrigerator, air conditioners etc.

For **1st Line treatment**, RNTCP has two regimens: treating new and retreatment cases. The medicines for patients are available as independent Patient-Wise Boxes (PWBs) containing medicines for the entire treatment of the patient.

For **2nd line treatment**, monthly Patient Wise Boxes (Type -A, Type-B & Type-C PWBs) for the different patient weight bands are made available by the programme.

Further, Cap Rifabutin-150mg is also procured centrally for co-infected TB HIV patients, put on 2nd line ART regimen. With regard to distribution, supplies of Cap Rifabutin are also delivered at GMSDs by manufacturers and are further distributed to RNTCP State Drug Stores, based on the NACO requirement. Upon receipt of Rifabutin supplies at SDS, they are further distributed to respective SACS (State AIDS Control Societies) based on their monthly stock reports.

Procurement of 1st Line Anti TB Medicines is limited to 'Prequalified Suppliers' defined as GMP compliant manufacturers as assessed by WHO Pre-qualification Programme (PQP) whereas 2nd Line Anti TB Medicines are procured from suppliers having WHO GMP certification as a requirement for the bidding process. For GFATM, procurement of 2nd line medicines is through Global Drug Facility (GDF) of Stop TB Partnership.

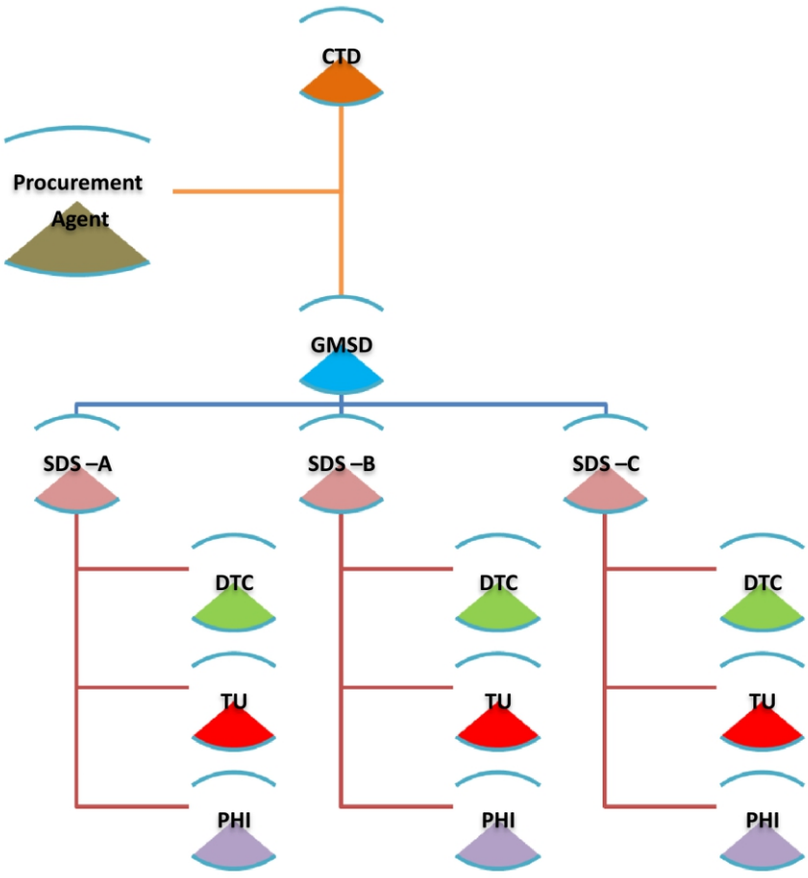
LED / Binocular Microscopes are also procured at the Central level by the Procurement Agency as per the General Finance Rules / World Bank procurement guidelines as funding for these is through Domestic Budget Support/World Bank credit.

Supply Chain Management

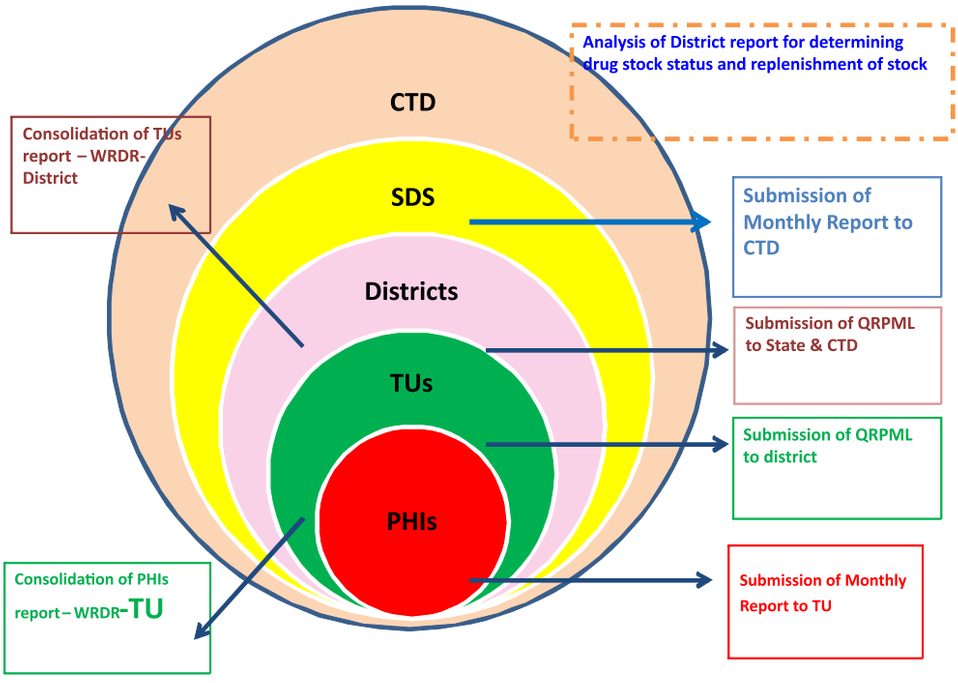
A good Supply Chain Management knows when to order or issue and how much to order or issue in order to maintain appropriate stock levels of all products to avoid stock outs and overstocking which can lead to product loss due to expiry. This is critical to the success of all health programs.

Distribution: The First Line Medicines are received at the GMSDs from the suppliers and based on the Monthly State Drug Stores and District Quarterly Programme Management and Logistics Report (QRPML), medicines are issued from the GMSDs.

For 2nd Line medicines, loose medicines are supplied at the GMSDs/SDS which have to be repacked into 1-monthly Type A, B and C Boxes for all the different weight bands. These Monthly boxes are then labelled, taken into record and distributed by the SDS as per requirement of the districts. The DTC in turn sends these boxes based on the quarter reports to its implementing TU to the PHI and finally to the DOT Centre/Provider, as the case may be.



Monitoring of Anti-TB Medicines is done based on Monthly and Quarterly Programme Management & Logistics Reports from PHIs and TU & Districts respectively. . The underlying presumption for consolidation of downline reports is that the QRPML should indicate accurate data on actual stock consumption and stock availability at all its downline medicine stores.



One of the important aspects of monitoring is Expiry Management wherein it is important that Principles of First-Expiry-First-Out (FEFO) are strictly adhered to by the drug stores at all levels to prevent expiry of medicines..

Reconstitution of medicine boxes is a process of retrieving residual medicines from PWBs of lost to follow up, dead and transferred-out patients and repacking them in quantities equivalent to and as per the description given on fresh PWBs for new & retreatment cases / Prolongation Pouches / loose medicines etc. It should be strictly centralized at the District Tuberculosis Center (DTC) or SDS for First line and Second Line medicines respectively.

Quality Assurance of Anti-TB Medicines has been accorded special importance by RNTCP and measures are taken at the time of procurement and also Post Procurement to maintain quality of Anti-TB Medicines. A comprehensive Quality Assurance (QA) Protocol is in place wherein samples from the field are regularly picked up for testing. This ensures continuous availability of good quality medicines at all stocking/ service delivery points under the programme.

Standard Operating Procedures (SOP) and Training Manuals have been developed for management of medicines. The SOP covers following aspects of supply chain management and provides detailed best practices to be followed by the State/ district/TU/PHI :-

- **Arrangement for transportation of Medicines-**. States should enter into a contract with these transporters for dispatches from SDS to districts and downline destinations.
- **Physical Verification** of inventory of anti-TB medicines and reconciliation thereof with store records should be carried out under the supervision of the concerned officer-in-charge at the State, DTC, TU & PHI drug stores, regularly at the end of each month.
- **Communication Infrastructure / Staffing** at the medicine stores
- **Location, Space and Storage arrangements** should be adequately available as per Good Storage Practices (GSP).
- **MIS for Medicines stock management**

For details, refer to SOP for district drug store and State drug stores available at tbcindia.gov.in.

Capacity building and Trainings on the SOPs are regularly conducted by CTD at the central & state level, as part of decentralization of this key area.

Stocking Norms for 1st Line Anti TB Drugs :-

Level	Stock for utilization	Reserve stock	Drug requirements
PHI	1 month	1 month	(Monthly consumption x 2) – (existing stock in PHI at end of the month)
TU drugstore	0 months	2 months	(Quarterly consumption / 3) x 4 – (existing stock in TU including PHI drug stores at end of the quarter)
DTC drugstore	0 month	3 months	(Quarterly consumption / 3) x 7 – (existing stock in DTC drug store including TU & PHI drug stores at end of the quarter)
SDS	0 months	3 months	(Quarterly consumption / 3) x 10 – (existing stock in SDS including stocks at all districts at end of the quarter)

Criteria for identification of short expiry Patient Wise Boxes (PWBs)

It is important that proactive measures be taken to ensure transfer of drugs to other districts/states to prevent expiry . The table below explains how to identify short-expiry drugs in the stores.

	Months				
Item	**Duration of treatment**	**Extension in IP**	**Possible Interruption**	**Max transit time for shifting of box**	**At risk of expiry, if less than ***
PC-1 PWB	6	1	2	1	10
PC-2 PWB	8	1	2	1	12

*** At the district level**

Stocking Norms for 2nd Line Anti TB Drugs

Flow of Drugs: At the beginning, the PHIs are supplied with a stock of two months (ie. stock for utilization in the first month along with a reserve stock of one month). Then every month, as per the monthly PHI report, they are supplied with stock from the TU which helps to maintain the reserve stock for a month at the PHI.

For the TU level to ensure that the PHIs have a month's utilization stock plus a reserve stock for one month, it needs to have a reserve stock of two months at the beginning of the quarter. District drug stores to replenish the stock at TU, upon the receipt of the drugs from their respective State Drug Stores, as per the stocking norms.

The district drug store should have at least a utilization stock of 1 month at the beginning of the quarter. Similarly the State Drug Stores should have at least a reserve stock of 3 months of consumption of the state.

It is expected that buffer stocks shall also be ensured at each level as per the stocking norms given in the table below.

Level	Stock for utilization	Reserve stock	Drug requirements
PHI	1 month	1 month*	(Monthly consumption x 2) – (existing stock in PHI at end of the month)
TU drugstore	0 months	2 months	(Quarterly consumption / 3) x 4 – (existing stock in TU including PHI drug stores at end of the quarter)
DTC drugstore	0 month	1 months	(Quarterly consumption / 3) x 5 – (existing stock in DTC drug store including TU & PHI drug stores at end of the quarter)
SDS	0 months	3 months	(Quarterly consumption / 3) x 8 – (existing stock in SDS including stocks at all districts at end of the quarter)

**All PHIs may not have a reserve stock. Only PHIs where patient/s are initiated or on treatment will have reserve stock of second line drugs.*

With regard to substitution of Tab Levofloxacin (Type-A Box) with Tab Moxifloxacin for Levofloxacin resistant MDR patients and substitution of Inj. Kanamycin (Type-B Box) with Inj Capreomycin for Kanamycin resistant MDR patients, the same needs to be addressed and done at State Drug Stores only.

Anti TB Drugs for adult patients in Daily Regimen

The daily regimen is being initiated in five states and to be scaled up in other states in a phased manner.

Medicines for daily regimen are being supplied in Patient-wise Boxes (PWBs) in following weight bands :-

Weight category	New TB Case	Previously Treated Case
25-39 kg	PC-1 DI	PC-2 DI
40-54 kg	PC-1 DII	PC-2 DII
55-69 kg	PC-1 DIII	PC-2 DIII
=70	PC-1 DIV	PC-2 DIV

Further, procurement of loose drugs for 5% of expected TB patients who may have side effects from fixed dose combinations (FDCs) and may require loose drugs instead of FDCs is also done through same mechanism and as per the procurement standards of GOI.

Dosages:-

Type of TB Case	Doses in IP		Doses in CP
New	56 doses (7 days * 8 weeks)		112 doses (7 days * 16 weeks)
Previously treated	84 doses (7 days * 12 weeks)		140 doses (7 days * 20 weeks)

Supply Chain Management

- **Distribution and monitoring**: Drugs to be distributed in the same manner as it is being distributed under Intermittent Regimen.
- **Reconstitution of medicine boxes** The reconstitution shall be done as per the existing RNTCP guidelines.
- **Treatment to Hospitalised patients –** preferably from the balance strips of PWBs from default / death patients. If same is not available, fresh boxes may be used.
- **Quality Assurance** of Anti-TB Medicines under daily regimen is same as it being done for Intermittent Regimen.
- **Storage**: Anti TB Drugs should be adequately maintained in quality condition; at room temperature, dry, pest / termite free area and secured under lock and key.
- **MIS for Medicines stock management** have been annexed at Annexures I-IV.

Stocking Norms for adult drug boxes:

For First three weight bands: 25-39 kg ,40-54 kg and 55-69 kg

Flow of Drugs: At the beginning, the PHIs are supplied with a stock of two months (ie. stock for utilization in the first month along with a reserve stock of one month). Then every month, as per the monthly PHI report, they are supplied with stock from the TU which helps to maintain the reserve stock for a month at the PHI.

For the TU level to ensure that the PHIs have a month's utilization stock plus a reserve stock for one month, it needs to have a reserve stock of two months at the beginning of the quarter.

The district drug store should have at least a utilization stock of 1 month at the beginning of the quarter. Similarly the State Drug Stores should have at least a reserve stock of 3 months of consumption of the state.

It is expected that buffer stocks shall also be ensured at each level as per the stocking norms given in the table below :

Level	Stock for utilization	Reserve stock		Drug requirements
PHI	1 month	1 month		(Monthly consumption x 2) – (existing stock in PHI at end of the month)
TU drugstore	0 months	2 months		(Quarterly consumption / 3) x 4 – (existing stock in TU including PHI drug stores at end of the quarter)
DTC drugstore	0 month	1 months		(Quarterly consumption / 3) x 5 – (existing stock in DTC drug store including TU & PHI drug stores at end of the quarter)
SDS	0 months	3 months		(Quarterly consumption / 3) x 8 – (existing stock in SDS including stocks at all districts at end of the quarter)

*The stocking norms are different under daily regimen as the shelf life may be varied from 2-3 years.

For fourth weight band: >70 Kg

Flow of Drugs: whenever a patient is diagnosed and to be put on treatment at PHI, the TU will send the drug box to the PHI immediately. At the end of each quarter, the shelf life would be reviewed and if required, inter TU or inter district transfers of the PWBs will be done to manage shelf life of drugs so that drug do not expired at any point of time. Accordingly, the stocking norms for the flow of drugs for weight band >70 are briefed in the table in next page:

Level	Stock for utilization	Reserve stock	Drug requirements
PHI	0 months *	0 months	Upon diagnosis of a patient under this category, respective TU will send the drug box to PHI immediately
TU drugstore	0 months	2 months	(Quarterly consumption / 3) x 2 – (existing stock in TU including PHI drug stores at end of the quarter)
DTC drugstore	0 month	1 months	(Quarterly consumption / 3) x 3 – (existing stock in DTC drug store including TU & PHI drug stores at end of the quarter)
SDS	0 months	3 months	(Quarterly consumption / 3) x 6 – (existing stock in SDS including stocks at all districts at end of the quarter)

Criteria for identification of short expiry Patient Wise Boxes (PWBs) . The table below explains how to identify short-expiry drugs in the stores.

Item	Months			
	Duration of treatment	**Possible Interruption**	**Max transit time for shifting of box**	**At risk of expiry, if less than ***
PC-1 D	6	2	1	9
PC-2 D	8	2	1	11

TB HIV: State Drug Stores will issue anti-TB drugs to the respective ART Centres as per the requirement quarterly. These ART centre shall submit the monthly report to the State Drugs Stores and the SDS to indicate the issues / dispatches to ART centres in their monthly report; submitted to the Central TB Division.