TUBERCULOSIS

KUHS MBBS PSM Exam-Oriented Colorful Study Notes

Topic: TB	**Paper:** PSM / P2-heavy	**Format:** Tables + Flowcharts + Recall Boxes

Prepared strictly by reorganizing the uploaded NotebookLM notes. Repetition removed; important exam words, definitions, classifications, criteria, regimens and programme points highlighted.

0. How to Use These Notes

Clinical frames covered from the source PDF

Adult urban slum screening camp: cough, fever with evening rise, weight loss, chest pain, productive sputum, AFB-positive sputum, NAAT Rifampicin-sensitive TB, recurrent TB, adherence/social risk factors, private pharmacy treatment, contact screening and community burden.
Child household contact and infant scenario: child contact with cough, infant of inadequately treated mother with prolonged fever, vomiting and convulsions, BCG/immunoprophylaxis and latent TB infection.
HIV-associated TB scenario: migrant labourer/truck driver living with HIV with suspected chest TB, diagnostic difficulty, management problems and AIDS reviving TB.

Study order / contents

1. Adult Pulmonary TB: Diagnosis and Sputum Microscopy

Exam focus: Probable diagnosis, sputum samples, tests for diagnosis, sputum microscopy as number-one case-finding method, and AFB grading/infectivity interpretation.

Probable diagnosis in the adult case

Final diagnosis to write

Bacteriologically confirmed pulmonary tuberculosis - drug-sensitive / Rifampicin-sensitive.
The case is bacteriologically confirmed because a biological specimen is positive by smear microscopy, culture or rapid molecular test such as CBNAAT/Xpert MTB/RIF.
It is pulmonary TB because the disease involves lung parenchyma or tracheobronchial tree. NAAT showing Rifampicin-sensitive organism places it under drug-sensitive TB.

Term	Exam definition / meaning
Bacteriologically confirmed TB	Biological specimen positive by **smear microscopy**, **culture** or **rapid molecular diagnostic test**.
Pulmonary TB (PTB)	Bacteriologically confirmed or clinically diagnosed TB involving **lung parenchyma** or the **tracheobronchial tree**.
Drug-sensitive / Rifampicin-sensitive	NAAT reports **Rifampicin sensitive**; hence first-line drug-sensitive pathway is followed.

Sputum samples for smear microscopy

Number and timing

- Collect **two sputum specimens** for microscopic examination.
- Timing may be **spot-early morning** or **spot-spot**.
- **One positive specimen** out of two is sufficient to declare smear-positive TB.

Rationale

- Two samples increase chances of finding TB bacilli compared with one sample.
- Overnight secretions build up in airways, so an early morning sample is more likely to contain bacilli.

Investigations/tests used for TB diagnosis

Category	Tests / points
Microbiological confirmation	**Sputum smear microscopy** for AFB using **Ziehl-Neelsen staining** or **LED fluorescence microscopy**.
Culture methods	**Solid media** such as Lowenstein-Jensen medium; **automated liquid culture** systems such as BACTEC MGIT 960, BacT Alert or Versatrek.
Drug sensitivity testing	Modified proportionate sensitivity testing for MGIT 960 system or economical variants using LJ medium.
Rapid molecular tests	**NAAT:** CBNAAT and TrueNat for detecting Mycobacterium tuberculosis and Rifampicin resistance. **LPA:** FL-LPA detects Rifampicin and Isoniazid resistance; SL-LPA detects fluoroquinolone and second-line injectable resistance.
Supportive clinical tools	**Chest X-ray**, **TST/Mantoux**, **IGRA**, histopathology and other tissue-based tests.

Why sputum microscopy is the number-one case-finding method

- It identifies the epidemiologically most important pulmonary TB cases - those actively excreting tubercle bacilli in sputum.
- Smear-positive cases form the main **pool of infection** in the community; identifying and treating them interrupts transmission.
- It is reliable, cheap and easy to perform at peripheral health settings.
- Sputum smear microscopy usually becomes positive when there are at least **10,000 organisms/ml of sputum**.

AFB grading and infectivity interpretation

AFB seen under 1000x microscopy	Report	Result / implication
No AFB per 100 oil immersion fields	0	Negative
1-9 AFB per 100 oil immersion fields	Scanty / exact number seen	Positive
10-99 AFB per 100 oil immersion fields	+ / 1+	Positive
1-10 AFB per oil immersion field	++ / 2+	Positive
> 10 AFB per oil immersion field	+++ / 3+	Positive; higher bacillary load

Interpretation line

The number of bacilli seen in the smear directly reflects **disease severity** and **patient infectivity**.

2. Rapid Molecular Diagnosis and NTEP Classification

Exam focus: Role of CBNAAT/NAAT/TrueNat/LPA, classification by site/status/treatment history/HIV/drug resistance, and lost to follow-up.

Role of CBNAAT / NAAT / other rapid diagnostic tools

Role	High-yield points
UDST	CBNAAT or TrueNat are offered to all TB patients to detect **M. tuberculosis** and simultaneously detect **Rifampicin resistance**.
Speed	CBNAAT detects DNA sequences by PCR from unprocessed sputum in about **90 minutes**, avoiding 2-8 weeks of conventional culture. TrueNat gives Rifampicin resistance result within about **1 hour**.
Better yield in difficult cases	Useful in smear-negative TB, extra-pulmonary TB, pediatric TB and TB among PLHIV.
Line probe assays	**FL-LPA:** detects Isoniazid and Rifampicin resistance. **SL-LPA:** detects fluoroquinolone and second-line injectable resistance.
Programme advantage	Rapid resistance detection helps early initiation of appropriate MDR/XDR-TB regimens.

NTEP classification of an adult TB patient

Parameter	Categories / details
Anatomical site	**PTB** - lung parenchyma/tracheobronchial tree; **EPTB** - sites outside lungs.
Bacteriological status	**Bacteriologically confirmed** or **clinically diagnosed**.
History of previous treatment	**New:** never treated or anti-TB drugs for less than 1 month. **Previously treated:** anti-TB drugs for 1 month or more.
Previously treated subtypes	**Relapse:** cured/treatment completed earlier, now recurrent episode. **Treatment after failure:** failed at end of most recent course. **Treatment after loss to follow-up:** previously treated and declared lost to follow-up.
HIV status	HIV-positive, HIV-negative or HIV status unknown.
Drug resistance status	Mono-resistance, poly-drug resistance, MDR-TB, XDR-TB or Rifampicin-resistant TB.

Specific scenario

A patient who does not report to the DOTS centre and has **treatment interruption for 2 consecutive months or more** is classified as **Lost to follow-up**.
Older terminology: **Defaulter / treatment after default**.

3. Drug-Sensitive Adult Pulmonary TB: Treatment and FDC Plan

Exam focus: Adult pulmonary TB management plan, daily FDC regimen, intensive/continuation phase and weight-based FDC tablets.

Core regimen for drug-sensitive TB

Treatment is provided as **daily Fixed-Dose Combinations (FDCs)** under **Directly Observed Treatment, Short-course (DOTS)**.
Standard regimen: **2 HRZE / 4 HRE**.

Phase	Duration / doses	Drugs	FDC formulation
Intensive Phase (IP)	**8 weeks** / 56 doses	Isoniazid (H), Rifampicin (R), Pyrazinamide (Z), Ethambutol (E)	**4-drug FDC:** H 75 mg + R 150 mg + Z 400 mg + E 275 mg
Continuation Phase (CP)	**16 weeks** / 112 doses	Isoniazid (H), Rifampicin (R), Ethambutol (E)	**3-drug FDC:** H 75 mg + R 150 mg + E 275 mg

Adult weight-band FDC schedule

Adult weight band	Number of FDC tablets per dose
25-34 kg	2 tablets
35-49 kg	3 tablets
50-64 kg	4 tablets
65-75 kg	5 tablets
>= 75 kg	6 tablets

Dose adjustment point

If the patient crosses into the next weight band during treatment, the dose is adjusted upwards.

4. Anti-TB Drugs and MDR-TB Medicines

Exam focus: First-line drugs, second-line drug groups, medicines used in longer MDR-TB regimens, shorter oral regimen and BPaLM.

First-line and second-line drugs against TB

Group	Drugs
Group 1: First-line oral anti-TB agents	Rifampicin (R), Isoniazid (H), Ethambutol (E), Pyrazinamide (Z), Rifabutin (Rfb).
Group 2: Injectable anti-TB agents	Streptomycin (S), Kanamycin (Km), Amikacin (Am), Capreomycin (Cm), Viomycin (Vm).
Group 3: Fluoroquinolones	Ciprofloxacin (Cfx), Ofloxacin (Ofx), Levofloxacin (Lfx), Moxifloxacin (Mfx), Gatifloxacin (Gfx).
Group 4: Oral second-line anti-TB agents	Ethionamide (Eto), Prothionamide (Pto), Cycloserine (Cs), Terizidone (Trd), Para-aminosalicylic acid (PAS).
Group 5: Agents with unclear efficacy / newer drugs	Clofazimine (Cfz), Linezolid (Lzd), Amoxicillin/clavulanate (Amx/clv), Thioacetazone (Thz), Imipenem-cilastatin (Ipm/Cln), Bedaquiline (Bdq), Delamanid (Dlm).

Medicines for longer MDR-TB regimens

MDR-TB medicine group	Rule	Medicines
Group A	Include all three medicines	Levofloxacin (Lfx) **or** Moxifloxacin (Mfx), Bedaquiline (Bdq), Linezolid (Lzd).
Group B	Add one or both medicines	Clofazimine (Cfz), Cycloserine (Cs) **or** Terizidone (Trd).
Group C	Add to complete regimen when A and B are insufficient	Ethambutol (E), Delamanid (Dlm), Pyrazinamide (Z), Imipenem-cilastatin (Ipm-Cln) **or** Meropenem (Mpm), Amikacin (Am) **or** Streptomycin (S), Ethionamide (Eto) **or** Prothionamide (Pto), PAS.

Shorter MDR-TB regimens mentioned in source notes

Regimen	Medicines
Shorter oral regimen	Bedaquiline, Levofloxacin, Clofazimine, Pyrazinamide, Ethambutol, high-dose Isoniazid and Ethionamide.
BPaLM regimen	Bedaquiline, Pretomanid, Linezolid and Moxifloxacin.

5. Drug-Resistant Tuberculosis

Exam focus: Definition, classification, causes and PMDT management points.

Definition

Drug-resistant TB occurs when *Mycobacterium tuberculosis* strains are not killed by the standard anti-tuberculosis drugs given during treatment.
It is largely a **man-made phenomenon** caused by inadequate treatment, poor drug quality or poor patient compliance.

Classification based on drug resistance

Type	Definition
Mono-resistance (MR-TB)	Resistance to **one first-line anti-TB drug only**.
Poly-drug resistance (PDR-TB)	Resistance to more than one first-line anti-TB drug, but **not to both Isoniazid and Rifampicin simultaneously**.
Multidrug resistance (MDR-TB)	Resistance to at least both **Isoniazid and Rifampicin**, irrespective of any additional resistance.
Rifampicin-resistant TB (RR-TB)	Resistance to **Rifampicin**, with or without resistance to other anti-TB drugs.
Extensively drug-resistant TB (XDR-TB)	Resistance to Isoniazid, Rifampicin, any fluoroquinolone (Levofloxacin or Moxifloxacin) plus at least one Group A drug (**Bedaquiline and/or Linezolid**).

Causes of drug resistance

Microbiological and programme causes

- Genetic mutations make drugs ineffective against mutant bacilli.
- Non-availability of drugs, wrong dosages or poorly organized TB control programmes.

Patient factors

- Poor adherence.
- Lack of information.
- Malabsorption.
- Substance abuse.

Management under NTEP / PMDT

- All diagnosed TB cases are offered rapid molecular testing (CBNAAT/TrueNat) for Rifampicin resistance as part of **Universal Drug Susceptibility Testing**.
- Shorter oral bedaquiline-containing MDR/RR-TB regimen: **9-11 months** duration.
- Longer oral M/XDR-TB regimen: **18-20 months**, using newer drugs such as Bedaquiline, Linezolid, Clofazimine and Cycloserine.

6. DOTS, DOTS-Plus and NTEP/RNTCP

Exam focus: DOTS definition and components, DOTS-Plus, burden reduction, NTEP objectives, salient features and new initiatives.

DOTS definition

DOTS - Directly Observed Treatment, Short-course is the internationally recommended strategy to ensure cure by providing effective medicines and confirming that the patient actually swallows them.
A health worker or trained DOT provider watches the patient swallow the drug.

DOTS component	Point
1	Political will and administrative commitment.
2	Diagnosis by quality-assured sputum smear microscopy.
3	Adequate supply of quality-assured short-course chemotherapy drugs.
4	Directly observed treatment.
5	Systematic monitoring and accountability.

DOTS-Plus and burden reduction

DOTS-Plus

- DOTS-Plus refers to the **Programmatic Management of Drug-Resistant TB (PMDT)**.
- It builds on DOTS and uses **second-line anti-TB drugs** to manage MDR-TB.

How DOTS reduces TB burden

- High cure rates by ensuring complete treatment.
- Cures sputum-positive infectious patients, rapidly making them non-infectious.
- Breaks the chain of transmission and reduces the community pool of infection.
- Prevents emergence of MDR-TB and XDR-TB by ensuring adherence.

Objectives of RNTCP / NTEP

- Achieve at least **85% cure rate** of infectious TB cases through DOTS.
- Augment case-finding through quality sputum microscopy to detect at least **70% of estimated cases**.
- Vision: **TB-free India** with zero deaths, zero disease and zero poverty due to TB; aim to eliminate TB by 2025 with incidence reduction by 80% and mortality reduction by 90%.

Salient features / new initiatives

Initiative	Exam points
Daily regimen	Transition from intermittent therapy to **daily weight-band-based FDCs** for all TB patients.
UDST	Upfront CBNAAT or TrueNat for every diagnosed TB patient to detect Rifampicin resistance.
Newer drugs	Introduction of **Bedaquiline** and **Delamanid** in DR-TB management.
NIKSHAY portal	Web-based, case-based IT surveillance system for monitoring patient treatment and outcomes.
Nikshay Poshan Yojana	Financial support through DBT of **Rs. 500 per month** to all notified TB patients for nutritional support.
Private sector engagement	JEET - Joint Effort for Elimination of Tuberculosis, to improve notification from private practitioners.
Active Case Finding	Systematic screening in vulnerable and hard-to-reach populations using mobile diagnostic vans.
TPT	Expansion of Isoniazid preventive therapy to all household contacts of pulmonary TB patients, irrespective of age.
Ban on TB serology	Import, sale and use of unreliable TB serological tests are banned.

7. TB Screening Strategy and Pulmonary TB Diagnostic Algorithm

Exam focus: Current screening strategy in India and new diagnostic algorithm for pulmonary TB under NTEP.

Current TB screening strategy in India

Strategy	Who / how
Passive case finding	TB detection among patients who self-report to health facilities with symptoms such as **cough for >2 weeks** and fever.
Intensified case finding	Systematic screening of patients at health facilities with co-morbidities/high-risk status: HIV/ART centres, diabetes clinics, antenatal clinics and nutritional rehabilitation centres.
Active case finding (ACF)	Active search among vulnerable populations such as slums, tribal areas, prisons and migrant camps using house-to-house campaigns.
Vulnerability mapping	Identify high-risk geographical pockets and perform periodic screening.
Screening of PLHIV	Use 4-symptom complex: **current cough, fever, weight loss, night sweats**.

Pulmonary TB diagnostic algorithm under NTEP

Presumptive TB	Sputum smear + CXR	Interpret results	CBNAAT/TrueNat if indicated	Treat / refer / alternate diagnosis

Flow: Presumptive TB => Sputum smear + CXR => Interpret results => CBNAAT/TrueNat if indicated => Treat / refer / alternate diagnosis

Step	Algorithm details
1. Identify presumptive TB	Symptoms: cough >2 weeks, fever, weight loss and other chest symptoms.
2. First investigations	Perform **sputum smear examination** using 2 samples (spot + early morning) and **Chest X-ray**. High-risk patients such as PLHIV and PMDT/high-MDR settings directly undergo CBNAAT.
3A. Smear positive + CXR suggestive	Microbiologically confirmed TB.
3B. Smear positive + CXR not suggestive	Microbiologically confirmed TB.
3C. Smear negative + CXR suggestive	Send sample for CBNAAT.
3D. Smear negative/not available + CXR not suggestive/not available	If clinical suspicion is high, send sample for CBNAAT.

CBNAAT interpretation

CBNAAT result	Next action
MTB detected + Rifampicin sensitive	Microbiologically confirmed TB; initiate first-line treatment.
MTB detected + Rifampicin indeterminate	Repeat CBNAAT on second sample. If again indeterminate, collect fresh sample for liquid culture/LPA.
MTB detected + Rifampicin resistant	Refer/manage according to Rifampicin resistance and PMDT guidelines.
MTB not detected or result not available	Consider alternate diagnosis and refer to specialist. Final outcome: clinically diagnosed TB or alternate diagnosis.

8. Transmission Prevention and Household Contact Measures

Exam focus: Advice to reduce transmission, advice to family/household contacts, and measures for spouse, children, infant and close contacts.

Advice to the sputum-positive TB patient

- Practice **cough etiquette**: cover mouth and nose with cloth while coughing or sneezing.
- Avoid **indiscriminate spitting** in public or at home.
- Ensure **hygienic sputum disposal**: disinfect sputum with bleach before disposal, or collect in a coconut shell, cover with sand/husk and burn it.
- Take anti-TB drugs regularly and completely under DOTS so that sputum becomes non-infectious quickly.

Advice to household contacts

Advice area	What to tell family members
Symptom screening	Look for persistent cough for >2 weeks, fever and similar symptoms.
Diagnostic testing	Collect sputum and test for AFB where indicated; if positive, start treatment immediately.
Treatment support	Act as DOT providers/supporters, help adherence and monitor adverse effects.
Follow-up	Undergo periodic follow-up and health check-ups.
Health education	Understand cause, spread, cure and available services; remove misconceptions and stigma.

Measures for spouse, children, infant and close contacts

Measure	Details
Systematic screening	Spouse, infants, children and all other household contacts must be systematically screened for active TB disease.
CXR and TBI testing	All efforts must be made to make Chest X-ray and TB infection testing available to rule out active disease.
TPT evaluation	All household contacts of pulmonary TB patients are at higher risk and must be evaluated for Tuberculosis Preventive Treatment (TPT), regardless of age or TBI status.
Infants and children	If active TB is ruled out, give Isoniazid chemoprophylaxis.
INH dose	**10 mg/kg daily for 6 months** for chemoprophylaxis.
Regimen options	**6H:** 6-month daily Isoniazid. **3HP:** 3-month weekly Isoniazid + Rifapentine for persons older than 2 years.
BCG	For newborn/infant: after ruling out active TB and giving indicated INH prophylaxis, give BCG if not already given.

9. Tuberculosis as a Social Disease

Exam focus: Social factors involved in transmission and substantiation of 'TB is a social disease with a medical aspect'.

Social factors involved in TB transmission

Social determinants	Social determinants	Social determinants
Poor quality of life and low standard of living.	Poverty and economic insecurity.	Poor housing, ill-ventilation and overcrowding.
Undernutrition / malnutrition.	Population explosion and large family size.	Substance abuse, especially smoking and alcohol abuse.
Lack of education / illiteracy.	Early marriages.	Lack of awareness about causes of illness and proper hygiene practices.

Substantiation: TB is a social disease with a medical aspect

- TB is a **barometer of social welfare** because its epidemiology is closely linked to socioeconomic conditions.
- In the Western world, TB incidence declined dramatically before chemotherapy or BCG; this was attributed to improved quality of life, better housing and improved nutrition.
- TB thrives in poverty, marginalized groups, urban slums and tribal pockets; poverty causes malnutrition, overcrowding and indoor air pollution, increasing vulnerability.
- It mainly affects people in the productive age group **15-54 years**, causing economic loss. A patient may take 3-4 months to recuperate, leading to wage loss.
- More than **90% of the economic burden** of TB in India is due to loss of life rather than morbidity alone.
- TB causes social stigma. Women may hide symptoms due to stigma, fear of divorce, limited decision-making power and restricted mobility. Nearly one-third of female infertility in India is caused by TB.
- Control needs more than drugs: community participation, health education, poverty alleviation, nutritional support such as Nikshay Poshan Yojana, and improved standard of living.

10. Epidemiological Indices, SDG Target, Trends and Irregular Treatment

Exam focus: Community indices, SDG/End TB targets, mortality trend assertion-reason, self-medication/irregular treatment consequences and NTEP alternatives.

Epidemiological indices used to measure TB problem

Index	Definition / importance
Incidence	Number of new and recurrent/relapse TB episodes (all forms) occurring in a given year.
Prevalence	Number of TB cases (all forms) at a given point in time; best practical index to estimate community case load.
Mortality from TB	Number of deaths caused by TB in HIV-negative people in a given year.
Case fatality rate	Risk of death from TB among people with active TB disease.
Case notification rate	New and recurrent TB episodes notified to WHO for a given year, per 100,000 population.
Case detection rate	Notifications of new and relapse cases in a year divided by estimated incidence of such cases in the same year.
Prevalence of drug-resistant cases	Prevalence of patients excreting tubercle bacilli resistant to anti-TB drugs.
Prevalence of infection	Percentage of individuals showing positive reaction to standard Tuberculin Skin Test.
Incidence of infection / Annual infection rate / Tuberculin conversion index	Percentage of population newly infected by *M. tuberculosis* during one year; one of the best indicators for evaluating the TB problem and its trend.

SDG and End TB targets

SDG 3.3

By **2030**, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases.

End TB Strategy target for 2030	Target
TB deaths	**90% reduction** compared with 2015.
TB incidence rate	**80% reduction**, to less than 20 per 100,000 population.
Catastrophic costs	**Zero** TB-affected families facing catastrophic costs due to TB.

Trend in mortality from TB in India

- TB in India shows a **secular trend** - a long-term trend over decades.
- Since death rate is declining and disease is declining in younger age groups, India may have crossed the peak of the secular epidemic curve and may be at the beginning of the declining limb.
- If an assertion says TB follows a **cyclic trend**, it is false. Cyclic trends are short-term fluctuations over days, weeks or few years, while TB changes slowly over decades.

Irregular self-medication: issues and consequences

Issues in management

- Poor adherence, wrong dosage and premature cessation after symptoms improve.
- Unaffordable out-of-pocket expenditure causing interruption.
- Lack of pre-treatment counselling about the need to complete the prolonged course.
- Malabsorption or substance abuse may contribute.

Consequences

- Treatment failure and relapse.
- Drug-resistant TB; irregular treatment allows resistant mutants to dominate.
- MDR-TB or XDR-TB may develop.
- Ongoing community transmission and addition of resistant strains to the pool of infection.
- Increased morbidity, advanced lung damage, complications and higher mortality.

What NTEP could have done differently

NTEP measure	How it prevents interruption
Free diagnosis and treatment	Free, quality-assured anti-TB drugs in patient-wise FDC blister packs remove cost barriers.
DOTS	Trained DOT provider watches the patient swallow medicines and improves compliance.
Patient-wise boxes	Free ready-to-use FDC blister packs with sufficient shelf-life ensure uninterrupted drug supply for the whole course.
Pre-treatment counselling	Counsel on disease, duration, dosage schedule and severe consequences of irregular treatment.
Nikshay Poshan Yojana	Rs. 500 per month through DBT for nutritional support during treatment.
NIKSHAY tracking	Register and track adherence; trace patient immediately when dose is missed and prevent loss to follow-up.
99 DOTS	IT-enabled adherence tool to monitor and ensure medication compliance.

11. Pediatric TB Contact Management

Exam focus: Child contact diagnosis, positive regimen, negative child management, prevention for infant/young child contact and advice to school teacher with TB.

Confirming TB diagnosis in a child contact

Component	Exam points
Clinical assessment	Persistent fever >2 weeks, unremitting cough >2 weeks, weight loss (>5% in 3 months) or no weight gain.
Microbiological proof	Every attempt must be made to prove diagnosis using appropriate respiratory/non-respiratory specimens.
CBNAAT	Preferred investigation. Young children may not expectorate sputum, so gastric aspirate/induced sputum or bronchoalveolar lavage is collected by skilled provider and tested.
Chest X-ray	Suggestive if miliary shadows, hilar/mediastinal lymphadenopathy or chronic fibro-cavitatory shadows are present.
TST / Mantoux	Use 2 TU PPD RT 23. Positive usually at **>=10 mm** induration, or **>=5 mm** in high-risk/immunocompromised child.
Microscopy	Sputum/gastric aspirate smear examination for AFB.

If child is TB-positive: treatment regimen

- Treat under NTEP with **daily dosages based on weight bands**.
- Use child-friendly, flavoured, dispersible FDCs based on **6 paediatric weight-band categories**.
- Drug-sensitive TB regimen: **2 months HRZE** in intensive phase, followed by **4 months HRE** in continuation phase.
- In severe extra-pulmonary TB, such as TB meningitis suggested by prolonged fever, vomiting and convulsions, CP may be extended by **12-24 weeks** based on physician decision.
- Give **Pyridoxine/Vitamin B6 10 mg/day** to all children receiving INH-containing therapy to prevent peripheral neuropathy.

If child is TB-negative: next steps

- If active TB is completely ruled out by clinical and diagnostic screening, manage as **Tuberculosis Infection (TBI)**.
- Start **Tuberculosis Preventive Treatment / chemoprophylaxis** to prevent progression to active disease.
- INH dose: **10 mg/kg/day daily for 6 months (6H)**.
- Alternative for children older than 2 years: **3-month weekly Isoniazid + Rifapentine (3HP)**.
- Regular follow-up to ensure symptoms of active TB do not develop during prophylaxis.

Prevention in infant/young child contact

Measure	Details
Systematic screening	Immediate contact tracing and screening for active TB using symptoms, CXR and TST/IGRA as indicated.
Chemoprophylaxis	Isoniazid preventive therapy for 6 months for all household contacts below 5 years, regardless of BCG or nutritional status.
BCG vaccination	For newborn/infant, after ruling out active TB and completing chemoprophylaxis, give BCG if not administered at birth.
Breastfeeding	Breastfeeding should not be discouraged. Mother should practice strict cough hygiene while feeding.
Vitamin supplementation	Infants breastfed by mothers receiving INH should receive **Pyridoxine 5 mg/day**.

Advice to a school teacher with TB

- Take all anti-TB drugs regularly and completely through DOTS.
- Always cover mouth and nose with cloth while coughing or sneezing.
- Dispose sputum safely using bleach disinfection or coconut shell with sand/husk and burning.
- Avoid spitting in public, at home or in school environment.

- Cooperate with contact tracing and screen family members, co-workers and school children with close contact for symptoms such as cough >2 weeks.
- Stop smoking, take adequate rest and maintain a nutritious diet.

12. BCG, Immunoprophylaxis and Latent TB Infection

Exam focus: BCG vaccine facts, need in India, MCQ statements on diluent/scar/strain/newborn dose, and latent TB infection/TPT.

Immunoprophylaxis available against TB

BCG fact	Correct point
Vaccine	**BCG - Bacillus Calmette-Guerin**, the only widely used live bacterial vaccine against TB.
Type	Live attenuated, freeze-dried / lyophilized vaccine derived from bovine strain of tubercle bacilli.
Strain	WHO-recommended **Danish 1331** strain.
Diluent	Reconstitute with **Normal Saline**; use within **3-4 hours** of reconstitution.
Dose	**0.05 ml** for newborns <4 weeks; **0.1 ml** for infants >1 month.
Route	Strictly **intradermal** using tuberculin syringe.
Site	Left upper arm, just above deltoid insertion.
Protective duration	Approximately **15-20 years**.

Why BCG is essential in India

- BCG gives appreciable protection against **severe childhood TB** even though overall protective efficacy varies from 0-80%.
- It is highly effective in preventing **tubercular meningitis** and **miliary TB**, which are highly fatal in children.
- In India, where TB prevalence and childhood infection risk are high, early BCG is crucial and is part of the Universal Immunization Programme.

BCG MCQ facts: correct and incorrect statements

Area	Correct statement	Incorrect / caution
Diluent	Normal Saline is correct.	Distilled water is incorrect; it irritates skin and may cause severe ulceration/sloughing intradermally.
Scar	Permanent tiny round scar 4-8 mm after 6-12 weeks is normal.	Do not revaccinate a child only because scar does not form.
Strain	Danish 1331 is correct.	Other strain options in MCQ are not the source-note answer.
Newborn dose	0.05 ml for newborns <4 weeks.	0.1 ml is incorrect for newborns; thin skin may lead to deeper injection, local abscess and painful axillary nodes.

Latent tuberculosis infection / Tuberculosis infection (TBI)

Point	Details
Definition	Infection with *M. tuberculosis* while asymptomatic and without active disease.
Lifetime risk	About **5-10%** of infected individuals develop clinical disease during lifetime.
High-risk progression groups	PLHIV, diabetics and household contacts of bacteriologically confirmed cases. PLHIV have 16-21 times higher progression risk in the source notes.
Diagnosis	TST/Mantoux or IGRA.
Management	Targeted TPT after ruling out active TB.
Eligible groups	All PLHIV adults and children >12 months; all household contacts of pulmonary TB patients regardless of age.
Regimen options	6-month daily Isoniazid (6H) or 3-month weekly Isoniazid + Rifapentine (3HP).

13. HIV-Associated Tuberculosis

Exam focus: Diagnostic problems, treatment/management problems and substantiation that AIDS is reviving the old problem of TB.

Diagnostic problems in HIV-associated chest TB

Problem	Why it matters
More negative sputum smears	Pulmonary TB in HIV-positive people often has negative sputum smear; culture or CBNAAT/Xpert MTB/RIF may be needed.
False-negative TST	TST depends on cell-mediated immunity; HIV damages immunity and may prevent response despite infection.
Atypical CXR / less cavitation	Cavitation requires immune-mediated tissue destruction; advanced HIV has less functioning immunity, so cavities may be absent.
More EPTB	Extra-pulmonary TB is more common in HIV co-infection, complicating clinical and microbiological diagnosis.

Treatment and management problems

Challenge	Details
IRIS	Immune Reconstitution Inflammatory Syndrome: paradoxical worsening of symptoms and CXR signs after starting TB treatment and ART due to immune restitution.
Severe adverse drug reactions	Adverse events are more common; **Thiacetazone** may cause severe/fatal skin reactions in HIV and is strictly contraindicated.
Timing of ART	Start anti-TB treatment first; start ART as soon as TB treatment is tolerated, usually between **2 weeks and 2 months**, balancing viral suppression and IRIS risk.
High mortality/complications	TB is the opportunistic infection most frequently killing HIV-positive people and a leading cause of HIV-associated mortality. Rigorous monitoring is needed to prevent failure and loss to follow-up.
Additional prophylaxis	Routine **co-trimoxazole prophylaxis** for all HIV-infected people with active TB, irrespective of CD4 count, to prevent other opportunistic infections and reduce mortality.

Substantiate: AIDS is reviving the old problem of tuberculosis

- In TB-endemic countries, many people acquire TB infection in childhood. HIV weakens immunity, allowing dormant bacilli to multiply rapidly.
- HIV-positive people are **25-50 times more likely** to develop active TB than HIV-negative people in the source notes.
- If a person with HIV is newly exposed, primary infection may progress rapidly to active, life-threatening disease.
- Previously cured HIV-positive people have higher risk of recurrent TB by relapse or reinfection.
- More infected people develop active disease and become infectious, increasing the community pool of infection and reviving the historical TB epidemic.

14. Last-Minute Recall and Source Coverage Checklist

Exam focus: Fast revision of numbers, definitions, regimens and all source-question angles covered.

Numbers and one-liners to memorize

Fact	Value / key line
Sputum samples	Two: spot-early morning or spot-spot.
Smear positivity threshold	At least 10,000 organisms/ml of sputum.
One positive sputum specimen	Sufficient to declare smear-positive TB.
CBNAAT result time	About 90 minutes.
TrueNat Rif resistance result	About 1 hour.
Lost to follow-up	Treatment interrupted for 2 consecutive months or more.
Adult DS-TB regimen	2 HRZE / 4 HRE.
Adult IP	8 weeks / 56 doses.
Adult CP	16 weeks / 112 doses.
NTEP nutrition support	Rs. 500/month via DBT under Nikshay Poshan Yojana.
INH prophylaxis	10 mg/kg/day for 6 months.
BCG newborn dose	0.05 ml intradermal.
BCG >1 month dose	0.1 ml intradermal.
BCG scar	4-8 mm scar at 6-12 weeks; no revaccination only for absent scar.
BCG diluent	Normal Saline; use within 3-4 hours.
PLHIV symptom screen	Current cough, fever, weight loss, night sweats.

Coverage checklist from the uploaded NotebookLM PDF

- Adult PTB diagnosis, sputum samples, investigations, sputum microscopy and AFB grading.
- CBNAAT/NAAT/TrueNat/LPA role, NTEP classification, loss to follow-up and adult FDC plan.
- First-line/second-line drugs, MDR-TB medicines, DR-TB classification and PMDT regimens.
- DOTS, DOTS-Plus, NTEP objectives, initiatives, screening strategy and diagnostic algorithm.
- Transmission advice, family/household contact counselling, spouse/child/infant measures and TPT.
- Social determinants, social disease substantiation, epidemiological indices, SDG targets and TB trend.
- Irregular/self-medication issues, consequences and NTEP interventions including NIKSHAY/99 DOTS.
- Pediatric contact diagnosis, child treatment regimen, child-negative management, infant prevention and teacher advice.
- BCG immunoprophylaxis, BCG MCQ facts, BCG necessity in India and latent TB infection.
- HIV-associated TB diagnostic problems, management problems and AIDS reviving TB.

Important formatting note

This PDF removes NotebookLM export headers/page text and the stray analysis line, while preserving the educational content and organizing it into exam-ready notes.