National Guidelines on diagnosis and treatment of Pediatric Tuberculosis

The National guidelines on Pediatric TB diagnosis and management were updated based on the recent evidence and advances in pediatric TB diagnosis and treatment in consultation with Indian Academy Pediatrics during January- February 2012.

1. **Diagnosis of Pediatric TB*:**

A new diagnostic algorithm is developed for pulmonary TB, the commonest type of extra pulmonary TB (Lymph node TB) and for other types of extra-pulmonary TB. The diagnostic algorithms for the diagnosis of pulmonary TB and Lymph node tuberculosis are provided in Annexure 1.

a. All efforts should be made to demonstrate bacteriological evidence in the diagnosis of pediatric TB. In cases where sputum is not available for examination or sputum microscopy fails to demonstrate AFB, alternative specimens (Gastric lavage, Induced sputum, broncho-alveolar lavage) should be collected, depending upon the feasibility, under the supervision of a pediatrician.

b. A positive Tuberculin skin test / Mantoux positive were defined as 10 mm or more induration. The optimal strength of tuberculin 2 TU (RT 23 or equivalent) to be used for diagnosis in children.

- There is no role for inaccurate/inconsistent diagnostics like serology (IgM, IgG, IgA antibodies against MTB antigens), various in-house or non-validated commercial PCR tests and BCG test.
- There is no role of IGRAs in clinical practice for the diagnosis of TB.

c. Loss of weight was defined as a loss of more than 5% of the highest weight recorded in the past three months.

2. **Intermittent versus Daily regimen:**

The intermittent therapy will remain the mainstay of treating pediatric patients. However, Among seriously ill admitted children or those with severe disseminated disease/ neuro-tuberculosis, the likelihood of vomiting or non-tolerance of oral drugs is high in the initial phase. Such, select group of **seriously ill admitted patients should be given *daily supervised therapy during their stay in the hospital*** using daily drug dosages. After discharge they will be taken on

*0-14 years

thrice weekly DOT regimen (with suitable modification to thrice weekly dosages). The following are the daily doses (mg per kg of body weight per day) Rifampicin 10-12 mg/kg (max 600 mg/day), Isoniazid 10 mg/kg (max 300 mg/day), Ethambutol 20-25mg/kg (max 1500 mg/day), PZA 30-35mg/kg (max 2000 mg/day) and Streptomycin 15 mg/kg (max 1gm/day).

3. The following newer **Case definitions** for pediatric TB patients will be incorporated in the RNTCP manuals.
    a. **Failure to respond**: A case of pediatric TB who fails to have bacteriological conversion to negative status or fails to respond clinically / or deteriorates after 12 weeks of compliant intensive phase shall be deemed to have failed response provided alternative diagnoses/ reasons for nonresponse have been ruled out.
    b. **Relapse:** A case of pediatric TB declared cured/completed therapy in past and has (clinical or bacteriological) evidence of recurrence.
    c. **Treatment after default**: A case of pediatric TB who has taken treatment for at least 4 weeks and comes after interruption of treatment for 2 months or more and has active disease (clinical or bacteriological).
    d. For programmatic purposes of reporting, all types of retreatment cases where bacteriological evidence could not be demonstrated but decision to treat again was taken on clinical grounds would continue to be recorded and reported as **"OTHERS"** for surveillance purposes.
4. **Drug dosages:**
    a. There will be six weight bands and three generic patient wise boxes will be used in combination to treat patients in the six weight bands. The details of the new weight bands and the new generic boxes are provided in Annexure 2 (Table 1). Since, it would take at-least 2 years for supply of these products under RNTCP. An interim guidance to optimize the use of the existing patient wise boxes and align them as much as possible to the new dosing recommendations has been developed and is provided in Annexure 2 (Table 2).
    b. To ensure that every child gets correct dosages, weighing of the patient in minimal clothing (as appropriate) using accurate weighing scales is essential.
    c. All pediatric TB patients should be shifted to next weight band if a child gains a kilogram or more, above the upper limit of the existing weight band.

5. **Drug formulations:**

   Since, the number of tablets is too many to consume and younger patients have difficulty in swallowing tablets the *DOT centers will be provided with pestle and mortars for crushing the drugs.* It will be the responsibility of the DOT provider to supervise the process of drug consumption by the child and in case any child vomits within half an hour of period of observation, fresh dosages for all the drugs vomited will be provided to the caregiver.

6. **Treatment regimens:**

   There will be only two treatment categories – one for treating 'new' cases and another for treating 'previously treated cases'. The treatment regimens are summarized in Annexure 2 (Table 3).

7. **TB Meningitis:**

   During intensive phase of TB Meningitis, Injection Streptomycin is to be replaced by Tablet Ethambutol.

8. **Extending intensive and continuation phase:**

   a. Children who show poor or no response at 8 weeks of intensive phase should be given benefit of extension of IP for one more month.

   b. In patients with TB Meningitis, spinal TB, miliary/disseminated TB and osteo-articular TB, the continuation phase shall be extended by 3 months making the total duration of treatment to a total of 9 months. A further extension may be done for 3 more months in continuation phase (making the total duration of treatment to 12 months) on a case to case basis in case of delayed response and as per the discretion of the treating physician/ pediatrician.

9. **TB preventive therapy:** The dose of INH for chemoprophylaxis is 10 mg/kg (instead of currently recommended dosage of 5 mg/kg) administered daily for 6 months. TB preventive therapy should be provided to:

   a. All asymptomatic contacts (under 6 years of age) of a smear positive case, after ruling out active disease and irrespective of their BCG or nutritional status.

   b. Chemoprophylaxis is also recommended for all HIV infected children who either had a known exposure to an infectious TB case or are Tuberculin skin test (TST) positive (>=5mm induration) but have no active TB disease.

c. All TST positive children who are receiving immunosuppressive therapy (*e.g.* Children with nephrotic syndrome, acute leukemia, *etc.*).
d. A child born to mother who was diagnosed to have TB in pregnancy should receive prophylaxis for 6 months, provided congenital TB has been ruled out. BCG vaccination can be given at birth even if INH chemoprophylaxis is planned.

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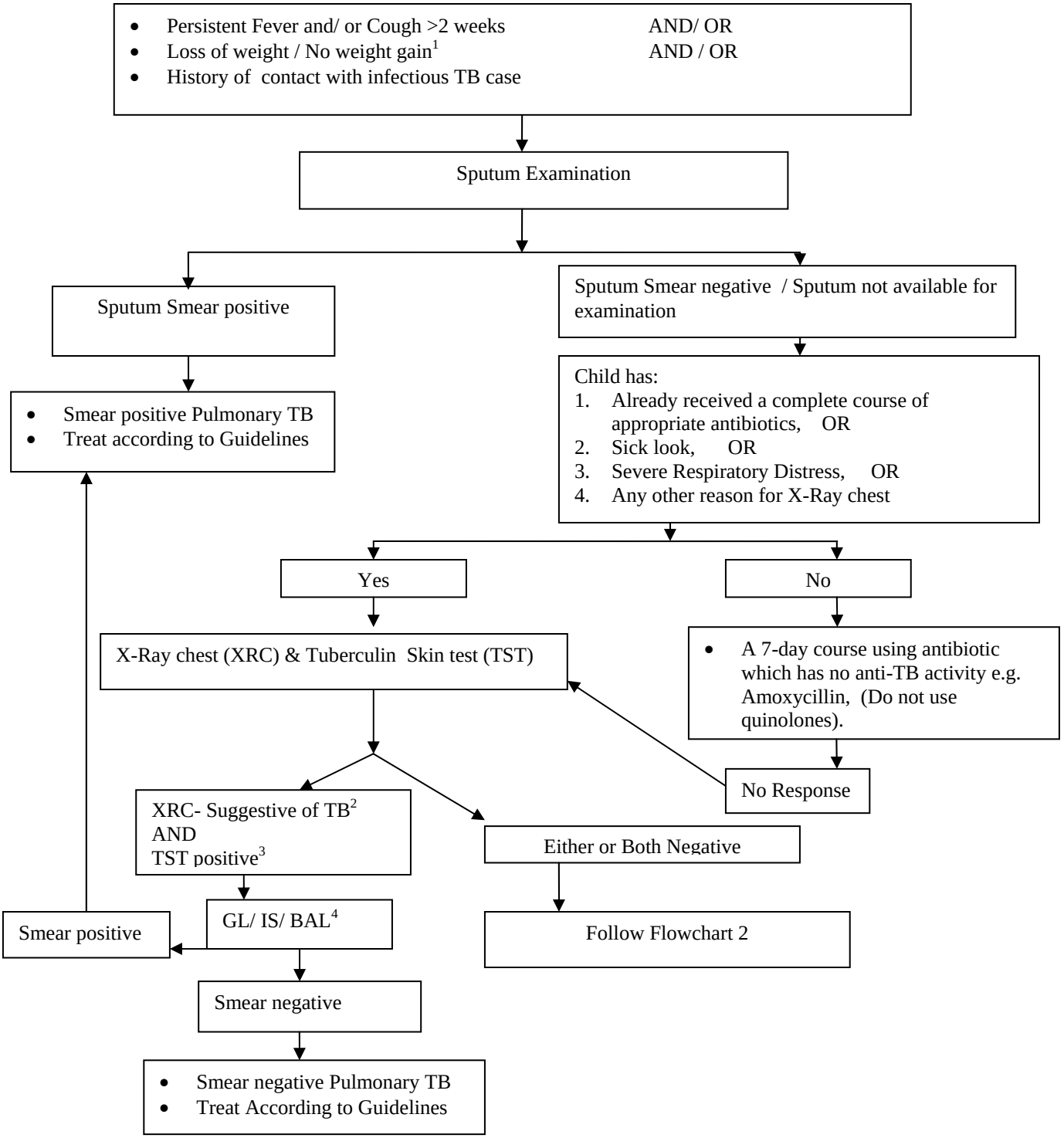
Diagnostic Algorithm for Pediatric Pulmonary Tb

Flowchart 1



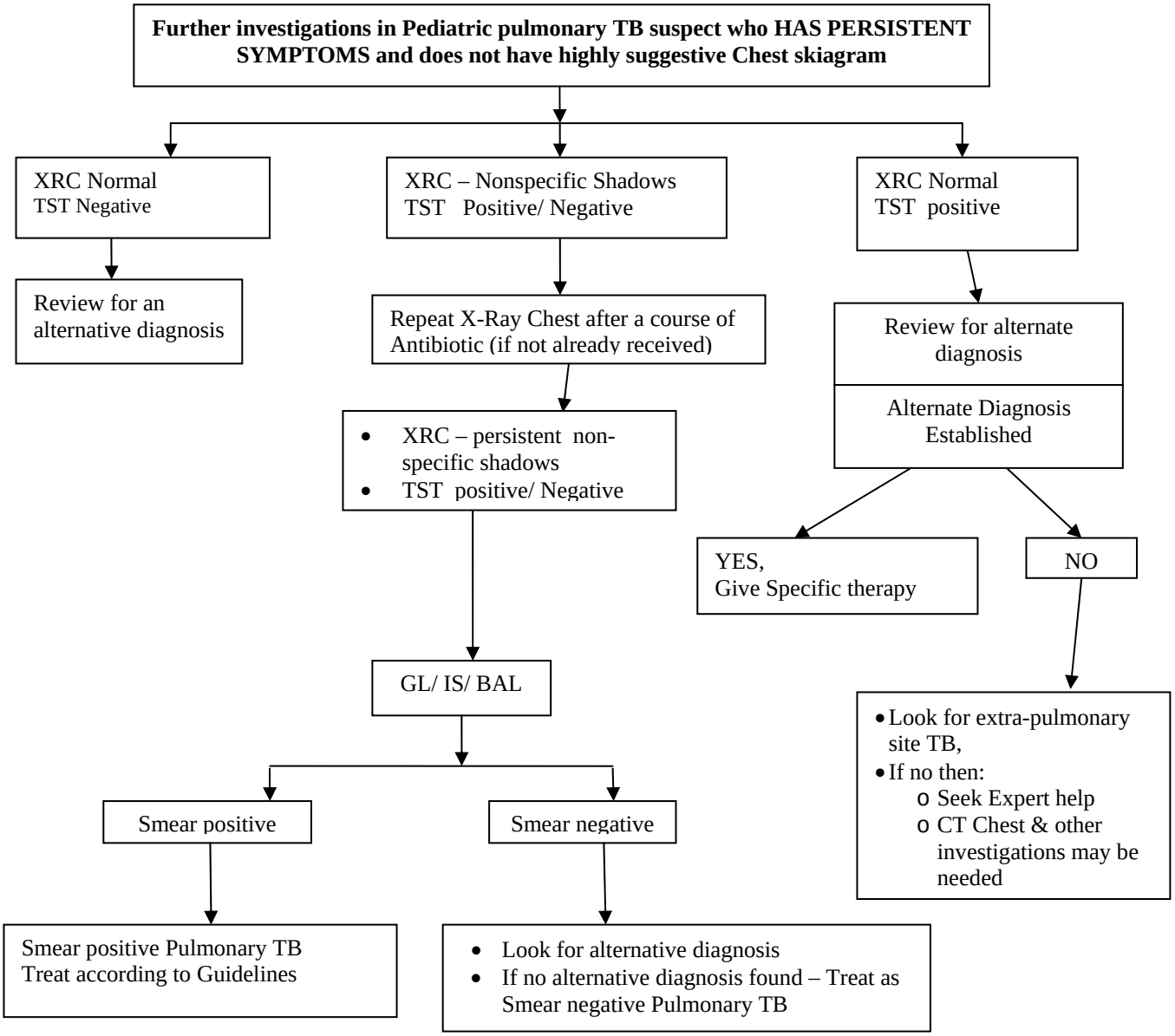
[1] History of unexplained weight loss or no weight gain in past 3 months; Loss of weight defined as loss of more than 5% body weight as compared to highest weight recorded in last 3 months.

[2] Radiological changes highly suggestive of TB are Hilar/paratracheal lymphadenitis with or without parenchymal lesion, Miliary TB, fibrocavitary pneumonia,.

[3] If the radiological picture is highly suggestive of TB, then proceed to do further investigations irrespective of the TST result as the sensitivity of the test is not 100%.

[4] All efforts including Gastric Lavage (GL)/ Induced sputum (IS) or Bronchoalveolar lavage (BAL) should be made to look for Acid fast bacilli (AFB) depending upon the facilities.

Flowchart 2


Further investigations in Pediatric pulmonary TB suspect who HAS PERSISTENT SYMPTOMS and does not have highly suggestive Chest skiagram
XRC Normal
TST Negative
XRC – Nonspecific Shadows
TST Positive/ Negative
XRC Normal
TST positive
Review for an alternative diagnosis
Repeat X-Ray Chest after a course of Antibiotic (if not already received)
Review for alternate diagnosis
Alternate Diagnosis Established
XRC – persistent non-specific shadows
TST positive/ Negative
YES,
Give Specific therapy
NO
GL/ IS/ BAL
Look for extra-pulmonary site TB,
If no then:
Seek Expert help
CT Chest & other investigations may be needed
Smear positive
Smear negative
Smear positive Pulmonary TB
Treat according to Guidelines
Look for alternative diagnosis
If no alternative diagnosis found – Treat as Smear negative Pulmonary TB

When to suspect pulmonary TB?

The above flowcharts depict the diagnostic algorithm for childhood pulmonary TB. Fever and / or cough of recent onset lasting for > 2 weeks should arouse suspicion of tuberculosis. It is important to document fever and not depend merely on impression. Fever can be of any type and the often-described evening rise of temperature is neither specific to this etiology.

Cough can be dry or moist and may be severe. Cough persisting beyond 2 weeks, particularly as an only symptom in an otherwise healthy child can be due to viral infection and is often not due to TB. Such children, therefore, do not always warrant extensive investigations. As cough and fever are otherwise also common, it is the unabated persistence of these symptoms for over 2 weeks which makes TB more likely. Recurrent symptoms with normal intervening period are less likely to be due to tuberculosis.

Recent unexplained loss of weight is an important pointer to the suspicion of tuberculosis.
History of exposure to an infectious TB patient (smear positive) should always prompt detailed examination for presence of the disease. However, in a symptomatic child, contact with a person with any form of active tuberculosis within last two years may be significant as many a times there can be a coexisting pulmonary involvement which went unrecognized due to lack of chest symptoms.

Diagnosis is also more likely in presence of risk factors such as recent history of measles or whooping cough and immunocompromised state including steroid therapy. TB remains an important cause of persistent pneumonia not responding to antibiotic therapy in our country.

Significant superficial lymphadenopathy must be specially looked for, as it may often coexist.

Diagnosis of tuberculosis can never be reliably made only on clinical features. The subject with above mentioned clinical features- in isolation or in combination - is only a TB suspect. Further investigations are always necessary to establish the diagnosis. Therapeutic trial with anti-TB drugs is therefore, not recommended and instead every attempt must be made to prove the diagnosis.

Bacteriology

Demonstration of AFB from any body fluid or tissue is confirmatory of tuberculosis. Such a proof is often lacking in childhood tuberculosis because of difficulty in collection of sputum and due to paucibacillary primary disease in children. However, studies do report that the yield of a positive test in advanced cases may be as high as in adults. Therefore, every attempt must be made to bacteriologically prove the diagnosis in every case of suspected tuberculosis.

Sputum smear examination is the primary investigation of choice if sputum specimen is available from the child. If sputum smear is positive, patient is diagnosed as smear positive pulmonary TB and should be initiated on TB treatment.
If sputum smear is negative or not available, then the patient is prescribed a course of antibiotics for duration of seven days, and in case symptoms persist, Chest X-ray and Tuberculin skin test (TST / Mantoux test) should be performed. Care should to be taken to use antibiotics which do not have anti-TB activity. Fluoroquinolones should not be used as antibiotics at this point in time. In case the symptoms continue unabated despite antibiotics, then chest X-ray and TST should be done.
However, in a sick looking or distressed child with persistent symptoms of >2weeks duration, chest skiagram and TST test should be performed immediately along with other workup for non-TB infections.

Even where the XRC is highly suggestive of TB (Hilar/paratracheal lymphadenitis with or without parenchymal lesion, Miliary TB, fibrocavitary pneumonia) AND TST is positive, an attempt should be made for establishing bacteriological diagnosis using alternative specimens like Gastric Lavage (GL)/ Induced sputum (IS) or Bronchoalveolar lavage (BAL) depending on the facilities available. Given that the sensitivity of TST is not 100%, in any case with highly suggestive radiology, one must attempt bacteriological diagnosis (as mentioned above) even if the TST is negative. Based on the bacteriological results, case may be labeled as smear positive or negative TB and treated appropriately.

In pediatric pulmonary TB suspect who HAS PERSISTENT SYMPTOMS and / or non-specific radiological shadows but efforts for a bacteriological diagnosis have failed, further investigative scheme is detailed in Flowchart 2. It is broadly divided into three possible situations.

1. If both TST and X-ray findings are negative, then TB is highly unlikely and an alternative diagnosis should be looked for.
2. In situations where the CXR has persistence of non-specific shadows despite a course of antibiotics, alternative samples for TB (GA/IS/BAL) should be sent to establish bacteriological diagnosis irrespective of the TST positivity. In case the alternative sample is AFB positive, then classify and treat as smear positive case. In case these samples are negative, then an alternative diagnosis should be diligently looked for. If no alternative diagnosis is established, the case may be classified and treated as smear negative TB.
3. If only TST is positive and X-ray chest is not suggestive, then look for TB at an extra-pulmonary site or an alternative diagnosis. Cases with persistent symptoms with TST positive but no evidence of TB at pulmonary/ extra-pulmonary site thus far, often need expert help and detailed investigations like CT chest, etc.

Bacteriological Investigations using following alternative specimens can be attempted:

1. Early morning gastric aspirate is a preferred specimen for most young children with suspected TB for detecting AFB or isolating *Mycobacterium tuberculosis*. The child is kept fasting for about 6 hours (at night) and an appropriate size intra-gastric tube is passed in the morning. Initially the aspirate is drawn from the stomach and then a further washing with 15-30 mL saline is taken. The contents so recovered are then immediately transferred to the laboratory. This specimen can also be collected as an ambulatory procedure after 4-6 hours fasting with some loss of yield.
2. Sputum collection is possible in older children with extensive and cavitatory disease, particularly if the patient has a wet cough.
3. Induction of sputum by 3% nebulized hypertonic saline can be tried in other children. The patient is pretreated with nebulized bronchodilators like salbutamol prior to induction. Following saline nebulisation, chest physiotherapy is done to loosen up the secretion and the samples are collected from the throat or nasopharynx using a collector attached to a suction at one end and a catheter/tube to the other. The suction catheter provokes cough and the secretions brought up are collected via suction.
4. Bronchial washings / bronchoalveolar lavage (BAL) can also be used as a diagnostic tool though the availability is limited. Bronchoscopy and BAL is often needed for evaluating cases of persistent pneumonia. Sometimes, there may be a co-existent peripheral lymphadenopathy, which is easily accessible and the aspirates from these can be used for bacteriological/ cytological diagnosis.

The experience shows that one needs to collect at least two samples of whatever type of the respiratory specimens one decides to choose to get the optimal yield. If the facilities are limited, these tests may be prioritized and atleast be done in all children with wet cough or children who have definite parenchymal lesion on chest skiagram.

Ziehl-Neelsen stain can reveal AFB only if sample contains > 10,000 bacilli per ml. Various culture methods such as LJ medium, Radiometric (Bactec) and Non-radiometric (MGIT) can be used for confirming diagnosis in paucibacillary state . The newer methods are capable of giving faster results and may be used if available. Mycobacterial culture and drug sensitivity assumes special significance in case of suspected drug resistance and should be attempted in cases needing retreatment (particularly the defaulters and failures but preferably in all cases).

Radiology

Chest radiograph merely localizes the site of pathology and does not define etiology. There are no pathognomonic radiological signs of tuberculosis. In relevant clinical setting, certain radiological lesions may strongly suggest tuberculosis and they include miliary, hilar or paratracheal lymphadenopathy with or without parenchymal involvement, pleural effusion and fibrocaseous cavitatory lesions. Rarely chest X-ray may be normal, such cases should be referred to an appropriate center for further detailed investigations, if the clinical suspicion and epidemiological risk (e.g. close contact of an infectious case, etc.) is high. In clinical practice, non-resolving chest shadows despite adequate antibiotic therapy in a symptomatic child raises the possibility of tuberculosis. It is worth mentioning that all persistent radiological lesions are not necessarily due to TB. Asymptomatic patients may have persistent shadows due to parenchymal scarring, pleural thickening, and healed fibro-atelectatic changes. On the other hand, a child with bronchiectasis or an interstitial lung disease may have presence of non-resolving shadows with persistent symptoms.

Ultrasonography of chest is helpful to assess pleural fluid collection; although decubitus chest *X*–ray film may also reveal similar information.

CT scan is rarely necessary and is not cost and radiation effective. Chest CT scan, however, may offer an opportunity for CT guided biopsy for tissue diagnosis.

Tuberculin test

The standard tuberculin skin test recommended for use is the Mantoux's test. Commercially available tuberculin in the country are of the strength of 1, 2 and 5 Tuberculin Unit (TU) PPD (RT23 equivalent). It is important to raise a wheal of about 6 mm after the intra-dermal injection and the test is read 48-72 hours after an injection. Ballpoint or palpatory methods are used to read the induration. The width of reaction (induration) in the horizontal plane is noted for interpretation. **Mantoux's test or PPD skin test is considered positive if the induration is 10 mm or more.** This cutoff was recommended using a 1 TU PPD RT23. **It is recommended that the 10mm cutoff may be continued to use for strengths of PPD only up to 5TU, however, 2TU PPD RT23 was considered to be the most suitable strength.** In no case strength higher than 5 TU should be used. Degree of reaction, including necrosis and ulceration, may not necessarily differentiate infected from diseased. Prior BCG vaccine has minimal influence on PPD reaction.

If the patient returns for reading beyond 72 hours but by 7th day, a positive test can still be read. A repeat test may be needed, if there is an induration less than 10mm and the suspect reports for reading beyond the stipulated time of 72hours post injection. Repeat tuberculin test when required should preferably be done on the other arm. The reading of the repeat test should be interpreted as in any other individual.

Status of other tests in vogue for diagnosing active tuberculosis in children:

1. **BCG Test:** BCG test is **not recommended** in diagnosis of tuberculosis.
2. **Serodiagnostic Tests:** As mycobacterial antigens overlap in different stages of infection and disease, there are no specific antigens that can confirm natural infection or active disease. Commercial antigen tests are not easily available or well evaluated. Commercial TB antibody tests share similar problems of interpretation and as they cannot differentiate natural infection from BCG vaccine induced infection and active disease from old healed disease. **These tests are not recommended for use.**
3. **Interferon Gamma Release Assays (IGRAs):** Newer generations of tests which measure the production of interferon gamma by the peripheral mononuclear cells have been developed to identify the patients with TB disease or latent infection. These use two antigens, early secretion antigen target (ESAT 6) and culture filtrate protein 10 (CFP 10), which are specifically present only in mycobacterium tuberculosis and not in other mycobateria or the BCG vaccine strain. These tests though have a principle similar to skin test but do away with the need for a repeat visit by the patient for reading purposes. Quantiferon Gold™ and T-spot™ are two of the commercially available IGRAs. These are being used in place of the skin test in low prevalence countries to detect latent TB infection. However, these expensive tests do not differentiate the TB infection from disease. The exact advantage of these tests in high burden situation is still not clear**. Hence, these are not recommended for use in the diagnostic algorithm for Tuberculosis in India.**
4. **PCR Tests and Gene Expert ®:** The inhouse Nucleic acid amplification tests (NAAT) and several commercial tests have poor sensitivity for diagnosing TB in smear negative samples. The laboratory contamination is a real risk. These tests are, therefore, not recommended for the diagnosis of childhood TB. NAATs are preferred for rapid identification of the culture isolates rather than using them directly over clinical specimens.
   However, Heminested, cartridge based real time PCR marketed as Xpert MTB/RIF™ is now endorsed by WHO as a likely point of care te**s**t using clinical specimens. This may be used, where available, particularly in previously treated cases or cases who are contacts of chronic/ MDR TB adults. The test has ability to detect Mtb as well as rifampin resistance in a matter of hours. Being cartridge based, real time technology, and the risk of cross contamination is also less. The utility of this test for extra-pulmonary specimens is being established.

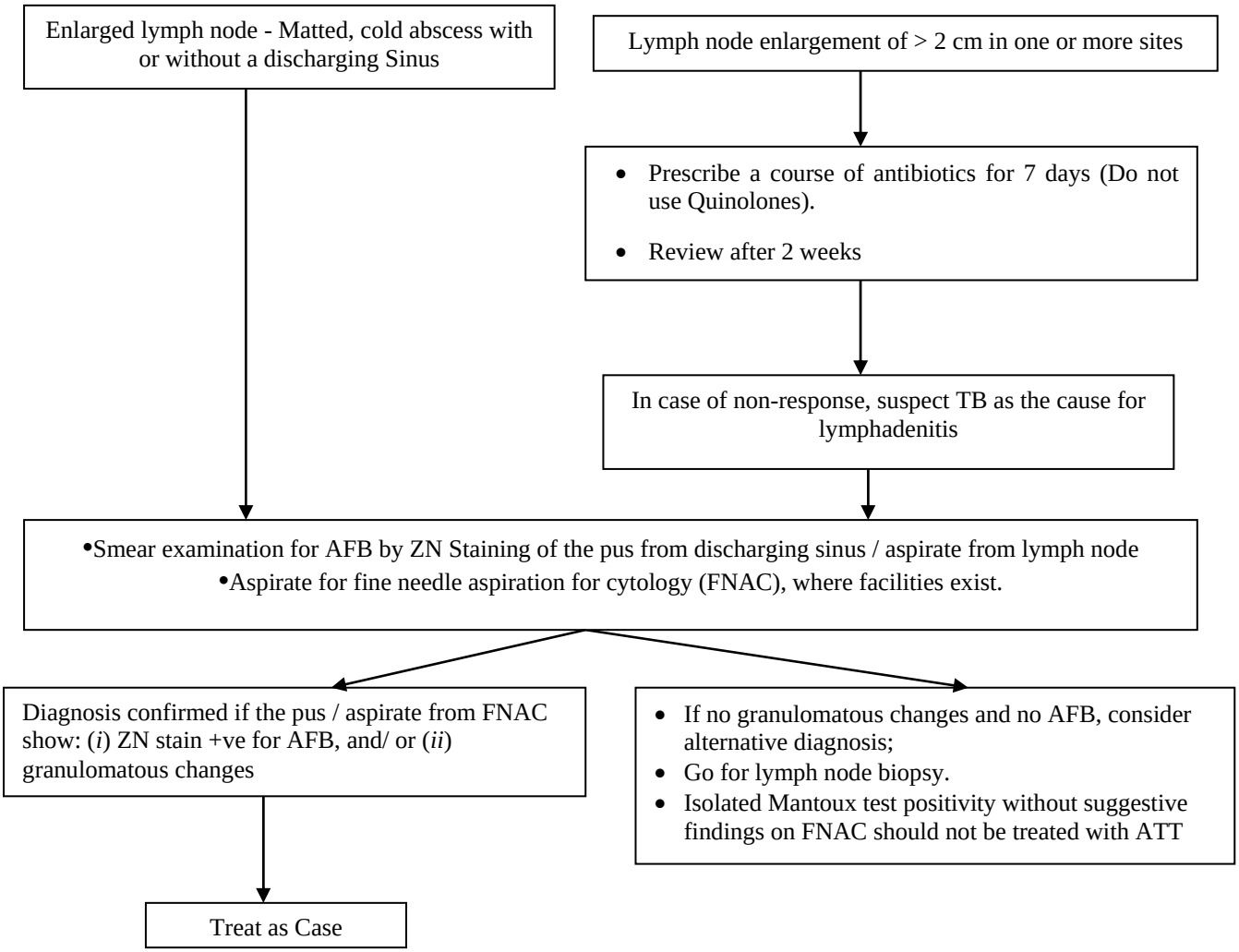
Extra-pulmonary Tuberculosis

TB lymphadenitis

This is most common form of extra pulmonary tuberculosis. Clinical correlate of diagnosis includes progressive enlargement of lymph node for more than 2 weeks, firm, minimally tender or not tender, sometimes fluctuating, may be matted and may have chronic sinus formation.

The diagnostic algorithm is shown below. Fine needle aspiration cytology (FNAC) is usually adequate for accurate diagnosis and it correlates well with biopsy in >90% of cases. Histopathology typically shows necrosis and epitheloid granuloma. It is important to look for AFB in FNAC specimen and it may be positive in 20-70% of patients. When FNAC is inconclusive, biopsy is necessary for confirmation of diagnosis. In children, lymphadenopathy is common due to recurrent tonsillitis and URIs as well. Such reactive lymphadenitis may clinically mimic tuberculosis but does not warrant anti-TB drugs. Persistent lymphadenopathy of significant size (say more than 2cm in the neck) should however, be investigated. TST is mostly positive in a significant proportion, but isolated skin test positivity is not enough to establish a diagnosis of TB. Hence anti-TB drugs should not be given unless the diagnosis of TB is confirmed by FNAC or histopathology.

Diagnostic algorithm for diagnosis of Lymph Node Tuberculosis



Pleural Effusion

If chest X-ray is suggestive of pleural effusion, pleural aspiration should always be performed for biochemical, cytological and smear examination by ZN stain to confirm the diagnosis. Typically, a tubercular effusion fluid is straw colored (pus, if aspirated, is very rarely due to TB etiology) has large numbers of cells (in hundreds; predominantly mononuclear), with high proteins (>3g/dL). Adenosine Deaminase (ADA) levels over 60 IU/L may be suggestive of tuberculous pleural effusion but is not diagnostic of TB. Pleural biopsy may be performed, where available, particularly when the fluid aspirate findings are inconclusive.

Tubercular meningitis (TBM)

Children with TBM present with a rather longer (>1 week) duration of fever, with vague CNS symptoms such as behavior changes, irritability, drowsiness, headache, vomiting and seizures. Physical examination reveals typically global encephalopathy with focal deficits, hydrocephalus and movement disorder. Risk factors for TBM include age < 5 years, contact with an adult suffering from tuberculosis, PEM grade III and IV, and HIV infection.

1. Typically CSF is clear to opalescent, usually does not show very high cell count (under 500 cells/mm^3) with lymphocytosis. Biochemical investigations reveal increased proteins and mild reduction in glucose. The typical CSF picture may, however, not always be seen. Furthermore, the typical CSF picture described above can also be mimicked by partially treated pyogenic meningitis. In such a situation, reassessing after 48-72 hours of treatment with a fresh set of broad spectrum potent antibiotics to evaluate improvement in clinical status as well as in CSF can be useful.
2. Efforts should be made to establish the diagnosis by collecting more supportive evidence using TST, chest skiagrams. Bacteriological diagnosis from appropriate samples including CSF is diagnostic. Many a time concomitant TB lesions elsewhere in the body (say, pulmonary) co-exist and can clinch the diagnosis. Mycobacterial culture from CSF should also be attempted but CSF culture has poor sensitivity (16%) though specificity is high (90%).
3. Neuroimaging is an important diagnostic modality. It may reveal one or more of the following findings: basal meningeal enhancement; hydrocephalus with or without peri-ventricular ooze; tuberculoma(s); or infarcts may be seen in different areas, especially in basal ganglia.
4. Normal CT scan does not rule out TBM and in case of strong clinical suspicion of diagnosis, a repeat follow-up CT scan after few days may show newly developing lesions. CSF abnormalities in TBM may take variable time up to few months to return to normal.
5. Besides routine CSF examination, CSF ADA is high in TBM. Various studies have a cut-off point between 7 and 11.3 IU/L for diagnosis. This may offer supportive evidence in favor of TBM but should not be taken in isolation.
6. CSF antigen and PCR tests are neither routinely available nor reproducible. They are, therefore, not recommended. CSF antibody tests have poor sensitivity and specificity and hence are not useful.

Tuberculoma

Often seen in older children, it may present as a focal seizure in supra-tentorial cortical lesion or with symptoms and signs of raised intracranial tension with multiple localizing signs and hydrocephalus in posterior fossa lesion. It may sometimes also be seen as a part of TB meningitis. Differentiation from other ring lesions, especially neurocysticercosis (NCC) is difficult in cortical lesion. A ring enhancing lesion is not pathognomonic of tuberculoma. A larger lesion > 20 mm, disc lesion or ring lesion with thicker rim with central nodule favors tuberculoma while multiple, smaller, thin rim with epicentric nodule favor NCC. MR spectroscopy may help in diagnosis of tuberculoma as it shows lipid peak.

Abdominal tuberculosis

It may present as localized disease such as mesenteric lymphadenopathy, intestinal disease, peritoneal involvement or systemic disseminated disease presenting as hepatosplenomegaly. Large matted lymph node mass may be clinically evident and ultrasound guided biopsy may help in confirming the diagnosis.

1. There are no standard guidelines for sonography diagnosis of abdominal tuberculosis. However, corroborative evidence includes: echogenic thickened mesentery with lymph nodes > 15mm in size; dilated and matted bowel loops; thickened omentum, and ascites. None of these findings, however, is specific to TB alone.
2. Barium follow-through examination may be suggestive of intestinal disease but is not confirmatory.
3. Exudative peritoneal disease presents as ascites that is often clinically evident. The ascitic tap should always be done in such situations and the fluid tapped is an exudate, typically showing lymphocytic predominant cellular response with high proteins (>3g/dL).

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Table 1: New weight bands and generic patient wise boxes with drug dosage delivered and pill burden

Body Weight	RIF	INH	PZA	ETB		mg/kg of body weight					PILL BURDEN		
						R	H	Z	E		2 drug FDC	3 drug FDC	individual drugs
				Product 1									
6	100	100	250	200		17	17	42	33		3	2	4
7	100	100	250	200		14	14	36	29		3	2	4
8	100	100	250	200		13	13	31	25		3	2	4
				Product 2									
9	150	150	400	300		17	17	44	33		3	2	4
10	150	150	400	300		15	15	40	30		3	2	4
11	150	150	400	300		14	14	36	27		3	2	4
12	150	150	400	300		13	13	33	25		3	2	4
				Product 3									
13	200	200	500	400		15	15	38	31		3	2	4
14	200	200	500	400		14	14	36	29		3	2	4
15	200	200	500	400		13	13	33	27		3	2	4
16	200	200	500	400		13	13	31	25		3	2	4
				Product 1+2									
17	250	250	650	500		15	15	38	29		6	4	8
18	250	250	650	500		14	14	36	28		6	4	8
19	250	250	650	500		13	13	34	26		6	4	8
20	250	250	650	500		13	13	33	25		6	4	8
				Product 2+2									
21	300	300	750	600		14	14	36	29		6	4	8
22	300	300	750	600		14	14	34	27		6	4	8
23	300	300	750	600		13	13	33	26		6	4	8
24	300	300	750	600		13	13	31	25		6	4	8
				Product 3+3									
25	400	400	1000	800		16	16	40	32		6	4	8
26	400	400	1000	800		15	15	38	31		6	4	8
27	400	400	1000	800		15	15	37	30		6	4	8
28	400	400	1000	800		14	14	36	29		6	4	8
29	400	400	1000	800		14	14	34	28		6	4	8
30	400	400	1000	800		13	13	33	27		6	4	8

Table 2: Revised Dosing and Weight bands according to existing Pediatric Patient wise boxes (PWB)

Weight	New	Tab	Rif del-r	INH del-r	PZA del-r	ETHAM del-r	RIF/ kg	INH/ kg	PZA/ kg	ETHAM / kg
6	PC13	1	75	75	250	200	13	13	42	33
7	PC13	1	75	75	250	200	11	11	36	29
8	PC13 + half of PC13	1.5	112.5	112.5	375	300	14	14	47	38
9	PC13 + half of PC13	1.5	112.5	112.5	375	300	13	13	42	33
10	PC13 + half of PC13	1.5	112.5	112.5	375	300	11	11	38	30
11	PC13 + half of PC13	1.5	112.5	112.5	375	300	10	10	34	27
12	PC14	1	150	150	500	400	13	13	42	33
13	PC14	1	150	150	500	400	12	12	38	31
14	PC14	1	150	150	500	400	11	11	36	29
15	PC14	1	150	150	500	400	10	10	33	27
16	PC14 + half of PC13	1 +1/2	187.5	187.5	625	500	12	12	39	31
17	PC14 + half of PC13	1 +1/2	187.5	187.5	625	500	11	11	37	29
18	PC14 + PC13	1 each	225	225	750	600	13	13	42	33
19	PC14 + PC13	1 each	225	225	750	600	12	12	39	32
20	PC14 + PC13	1 each	225	225	750	600	11	11	38	30
21	PC14 + PC13	1 each	225	225	750	600	11	11	36	29
22	PC14 + PC13	1 each	225	225	750	600	10	10	34	27
23	PC14	2	300	300	1000	800	13	13	43	35
24	PC14	2	300	300	1000	800	13	13	42	33
25	PC14	2	300	300	1000	800	12	12	40	32
26	PC14	2	300	300	1000	800	12	12	38	31
27	PC14	2	300	300	1000	800	11	11	37	30
28	PC14	2	300	300	1000	800	11	11	36	29
29	PC14	2	300	300	1000	800	10	10	34	28
30	PC14	2	300	300	1000	800	10	10	33	27

TABLE 3: Treatment Categories and Regimens for Childhood Tuberculosis

Category of treatment	Type of patients	TB treatment regimens	
		Intensive phase	Continuation phase
New cases	• New smear-positive pulmonary Tuberculosis (PTB) • New smear-negative PTB • New extra-pulmonary TB.	$2H_3R_3Z_3E_3$*	$4H_3R_3$
Previously treated cases	• Relapse, failure to respond or treatment after default • Re-treatment Others	$2S_3H_3R_3Z_3E_3$ + $1H_3R_3Z_3E_3$	$5H_3R_3E_3$

H=Isoniazid, R= Rifampicin, Z= Pyrazinamide, E= Ethambutol, S= Streptomycin

**The number before the letters refers to the number of months of treatment. The subscript after the letters refers to the number of doses per week.*

Pulmonary TB refers to disease involving lung parenchyma. Extra Pulmonary TB refers to disease involving sites other than lung parenchyma. If both pulmonary and extra pulmonary sites are affected, it will be considered as Pulmonary for registration purposes. Extra Pulmonary TB involving several sites should be defined by most severe site.

***Smear positive**: Any sample (sputum, induced sputum, gastric lavage, broncho-alveolar lavage) positive for acid fast bacilli.*
***New Case**: A patient who has had no previous ATT or for less than 4 weeks.*
***Relapse**: Patient declared cured/completed therapy in past and has evidence of recurrence.*
***Treatment after Default**: A patient who has taken treatment for at least 4 weeks and comes after interruption of treatment for 2 months and has active disease.*
Failure to respond: A case of pediatric TB who fails to have bacteriological conversion to negative status or fails to respond clinically / or deteriorates after 12 weeks of compliant intensive phase shall be deemed to have failed response provided alternative diagnoses/ reasons for non-response have been ruled out.
***Others**: Cases who are smear negative or extra pulmonary but considered to have relapse, failure to respond or treatment after default or any other case which do not fit the above definitions.*

In patients with TB meningitis on Category I treatment, the four drugs used during the intensive phase can either be HRZE or HRZS. The present evidence suggests that Ethambutol can be used in children.

Children who show poor or no response at 8 weeks of intensive phase may be given benefit of extension of IP for one more month. In patients with TB Meningitis, spinal TB, miliary/disseminated TB and osteo-articular TB, the continuation phase shall be extended by 3 months making the total duration of treatment to a total of 9 months. A further extension may be done for 3 more months in continuation phase (making the total duration of treatment to 12 months) on a case to case basis in case of delayed response and as per the discretion of the treating physician.

Under Revised National Tuberculosis Program (RNTCP, all patients shall be covered under directly observed intermittent (thrice weekly) therapy. The supervised therapy is considered as the most optimal treatment and is followed under RNTCP. It is important to ensure completion of treatment in every case put on treatment to prevent emergence of resistance, particularly to Rifampicin. In the rare circumstances where a patient is given daily therapy, observation and completion of therapy remains as important. It is the duty of the prescriber to ensure appropriate and complete treatment in all cases.