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ORIGINAL ARTICLE

The main questions of pediatricians about children and adolescents with tuberculosis

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Abstract

Objective: Childhood tuberculosis (TB) is a matter of great importance that led pediatricians to have great difficulties on dealing with several aspects of the disease and the TB latent infection (TBLI). We try to find out what these difficulties are to promote means of disseminating information. **Methods:** This article consolidated the most frequent questions about children and adolescents with TB made by pediatricians during eight Brazilian Pediatrics Congresses, and of Pediatric Pulmonology Congress within a 12-year period, from 2003 to 2015. **Results:** About 200 related questions were recorded by authors, such as: diagnosis of symptomatic child or with TBLI (60%); BCG vaccination (10%); Tuberculin Skin Test (TST) and other diagnosis methods (10%); treatment (10%); approach to TB-contact newborns (5%); and preventive measures for Health Care Professionals (5%). The most frequent 25 questions involving all these queries were selected, such as: "How to investigate and treat TB and ILTB?"; "What should be done if there is no BCG scar?"; "What does Xpert MTB/RIF mean?"; "TB treatment was changed?"; "What should be done with TB-contact newborns?"; "How to protect Health Care Professionals against TB?". **Conclusion:** The same questions remained for years, changing when there were also changes in standards for tuberculosis control, such as a new diagnostic test or treatment change. The answers were organized in easy-to-read texts as a didactic material to enhance professionals' performance in the fight against TB.

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INTRODUCTION

In 1993, the World Health Organization (WHO) declared tuberculosis (TB) a global public health emergency. Brazil ranks 17 among the 22 endemic countries and accounts for 80% of the total TB cases worldwide. In 2014, TB killed 1.5 million people worldwide, including 136,000 children, which corresponds to 400 infant deaths per day[1,2].

TB is caused by *Mycobacterium tuberculosis*, a slow-growing bacillus. The pulmonary form is the most common and affects predominantly children, corresponding to 85% of all cases. It is believed that TB can affect any body part; the most common extrapulmonary forms are pleural, osteoarticular, peritoneal, and meningeal. In some cases, the disseminated form may occur. TB has high morbidity and mortality, particularly in developing countries, associated or not with acquired immunodeficiency syndrome (AIDS)[1,3,4].

TB deserves special attention from healthcare professionals and society as a whole. It is a public health emergency considering its significant magnitude, impact, and population vulnerability. Control strategies should be developed considering humanitarian, economic, and public health aspects.

Children are at a higher risk of severe TB, such as brain TB (TB meningitis) and disseminated TB (miliary TB) because the immune response of children is still under development[2].

The primary risk factors for TB in children include close contact with individuals with pulmonary TB (especially those with positive bacilloscopy or culture); age < 5 years; HIV infection; and severe malnutrition[2].

TB is diagnosed in children by clinical and radiological evaluation combined with bacilloscopy, sputum culture, and rapid molecular tests. Early detection of TB is fundamental to prevent disease dissemination and reduce the number of cases.

In children aged < 10 years, TB has specific features that should be considered during diagnostic investigation. The pulmonary form in children is different from that in adults because it is often nonbacillary or paucibacillary, i.e., the small number of bacilli in the lesions yield negative results in the bacteriological test. In addition, children are usually unable to expectorate[1-3].

In the absence of accessible and sensitive diagnostic tests that are not based on sputum samples, a reliable diagnosis can be made by establishing criteria that involve a careful history of exposure, clinical and radiological picture, and screening for pulmonary and suspected extrapulmonary TB. Several point-based scores have been proposed to evaluate such criteria. Brazil uses its own score, with high sensitivity and specificity[3].

There are also peculiarities in the diagnosis and management of children who come into contact with infected individuals, for example, in the interpretation of the tuberculin test (TT). Infected individuals should receive personalized care for the treatment of latent TB infection (LTBI) whenever *M. tuberculosis* is confirmed in an asymptomatic child[1,5,6].

It should also be stressed that since 2014, the execution of TT is limited to the availability of purified protein derivative (PPD).

In 2014, the WHO approved the "Global Strategy and Goals for Tuberculosis Prevention, Care, and Control after 2015," later designated the "End TB Strategy," which proposes goals for controlling the disease until 2035, including a 95% reduction in the number of deaths from TB and a 90% reduction in disease incidence[7-9].

The achievement of these goals depends on strategies aimed at improving TB prevention, diagnosis, treatments, and patient-centered approaches, and increasing scientific knowledge and innovation. Implementation started in 2016 on an international scale[7-9].

TB control can only be achieved if strategies are conceived globally and acted locally using the End TB Strategy, including planning, training, diagnosis, and follow-up of all stages of the TB control program. To that end, educational actions can be planned by identifying the main doubts of health professionals related to TB.

The objective of this study is to identify and discuss the most common doubts pediatricians have about TB in children and adolescents and analyze which doubts persisted during the study period.

Considering the doubts raised by pediatricians about the clinical presentation, diagnosis, and treatment of TB in children and adolescents, several questions asked by these professionals have been grouped to prepare teaching material related to TB and ultimately help decrease TB morbidity and mortality in the population of that age range.

METHODS

This retrospective descriptive study collected data for 12 years.

The authors documented the questions asked by participants of eight conferences on TB in children and adolescents held during the Brazilian Congress of Pediatrics (CBP) and Brazilian Congress of Pediatric Pulmonology from the 32nd CBP in São Paulo in 2003 to the 37th CBP in Rio de Janeiro in 2015.

All questions were written down and grouped into themes related to TB in children and adolescents to assess the knowledge of pediatricians about TB in this population. The themes included epidemiology, contact history, Bacillus Calmette-Guérin (BCG) vaccination, diagnosis, complementary tests, treatment, clinical management of newborns who come into contact with infected adults, and contact of health professionals with TB.

RESULTS AND DISCUSSION

Approximately 200 questions were written down by the authors. These questions were related to diagnosis in children with symptoms or latent infection (60%), BCG vaccination and revaccination (10%), TT and other diagnostic methods (10%), treatment (10%); contact of newborns with TB-infected individuals (5%); and contact of healthcare professionals (5%). Questions about TB were asked in all evaluated congresses as direct questions or clinical cases.

The questions were organized into sections according to the proposed themes. Each section contained questions and a short explanatory text.

I. Epidemiology

- Why is the prevalence of tuberculosis high in Brazil, if medication is effective?

It is estimated that one-third of the world population-two billion people-is infected with TB. Among those infected, 10% will manifest the disease. Disease onset occurs in the first year of infection in 50% of this population and at any other time during their lifetime in the remaining 50%. It is estimated that there are 500,000 cases of TB in children worldwide. Brazil ranks 20 in the number of cases, and the challenge is to reduce TB incidence by 90% and the mortality rate by 95% by 2035[1,7,9].

The incidence of TB in Brazil is 32.4 cases per 100,000 inhabitants. This high rate is due to several socioeconomic factors, including poverty in most urban centers, prevalence of AIDS, and poor primary health care[1,10].

Annually, an average of three million deaths due to TB occur worldwide, including 74,000 deaths in children. In Brazil, an average of 6,000 deaths occur annually, of which 15% are children. In 2008, TB was the fourth leading cause of death by infectious diseases and the first among AIDS patients[9,10].

Another cause for concern is the prolonged 6-month treatment, resulting in treatment abandonment, which in turn may lead to the development of bacilli that are resistant to the initial treatment scheme.

The End TB target will only be reached with sustained defense, greater commitment, increase of resources, and a joint effort by all players involved in providing healthcare to children. Moreover, the association of TB and HIV infection and the proliferation of resistant strains represent additional challenges on a global scale[8].

II. Contacts

- What is the definition of a TB contact?
- How should the contacts of TB patients be reached?
- Should chest X-rays be performed when investigating TB contacts?
- How should LTBI be addressed?
- What is the approach to children who came into contact with multidrug-resistant TB (MDR-TB)-infected patients?

A TB contact (formerly designated a "communicant") is any person who lives in the same environment as the original patient in the period in which the disease is diagnosed. Such cohabitation may occur at home, workplace, long-term institutions, and schools. The contact's degree of exposure should be evaluated on an individual basis, taking into account the form of the disease, environment, and length of exposure[1].

All the contacts of patients diagnosed with TB should be investigated, particularly if the contacts are children in the first year of life because they are at a higher risk of becoming ill (> 40%)[1,6].

Primary TB in children should be investigated in two instances: when the child comes into contact with a TB-infected adult, particularly those with bacilliferous infections, and when a child presents with a clinical and radiological picture suggestive of TB[1,3]. Adults with cough without apparent reason lasting for more than 3 weeks should be considered respiratory symptomatic (RS) and should be subjected to sputum bacilloscopy. These adults are usually the source of contamination to the child.

In Brazil, chest X-ray and TT should be performed according to TB investigation flowcharts published by the Ministry of Health (Figures 1 and 2)[1,11].

TT readings can be considered reactive when measuring ≥ 5 mm in children who have not been vaccinated with BCG or who have been vaccinated >2 years before TT or when measuring ≥ 10 mm in children who have been vaccinated with BCG < 2 years before TT[1].

Treatment of LTBI, or isoniazid prophylactic therapy (IPT), formerly designated "secondary chemoprophylaxis," is indicated for the following[1,12]:

- Close contact with individuals infected with TB, after the possibility of active disease has been ruled out; PPD-reactive individuals with TT readings of > 5 mm if not vaccinated with BCG or if vaccinated > 2 years before TT or TT reading of > 10 mm if vaccinated with BCG < 2 years before TT
- Recent conversions, i.e., individuals whose PPD status changed from non-reactive to reactive in an interval between tests of < 2 years
- Individuals who are PPD-reactive and have clinical conditions associated with immunodepression and a higher incidence of TB, such as those with insulin-dependent diabetes, those with severe kidney disease, those undergoing prolonged corticosteroid therapy or anticancer chemotherapy, and those positive for HIV;
- Individuals with radiological images compatible with inactive TB (fibrotic lesions) and those without previous history of adequate chemotherapy.

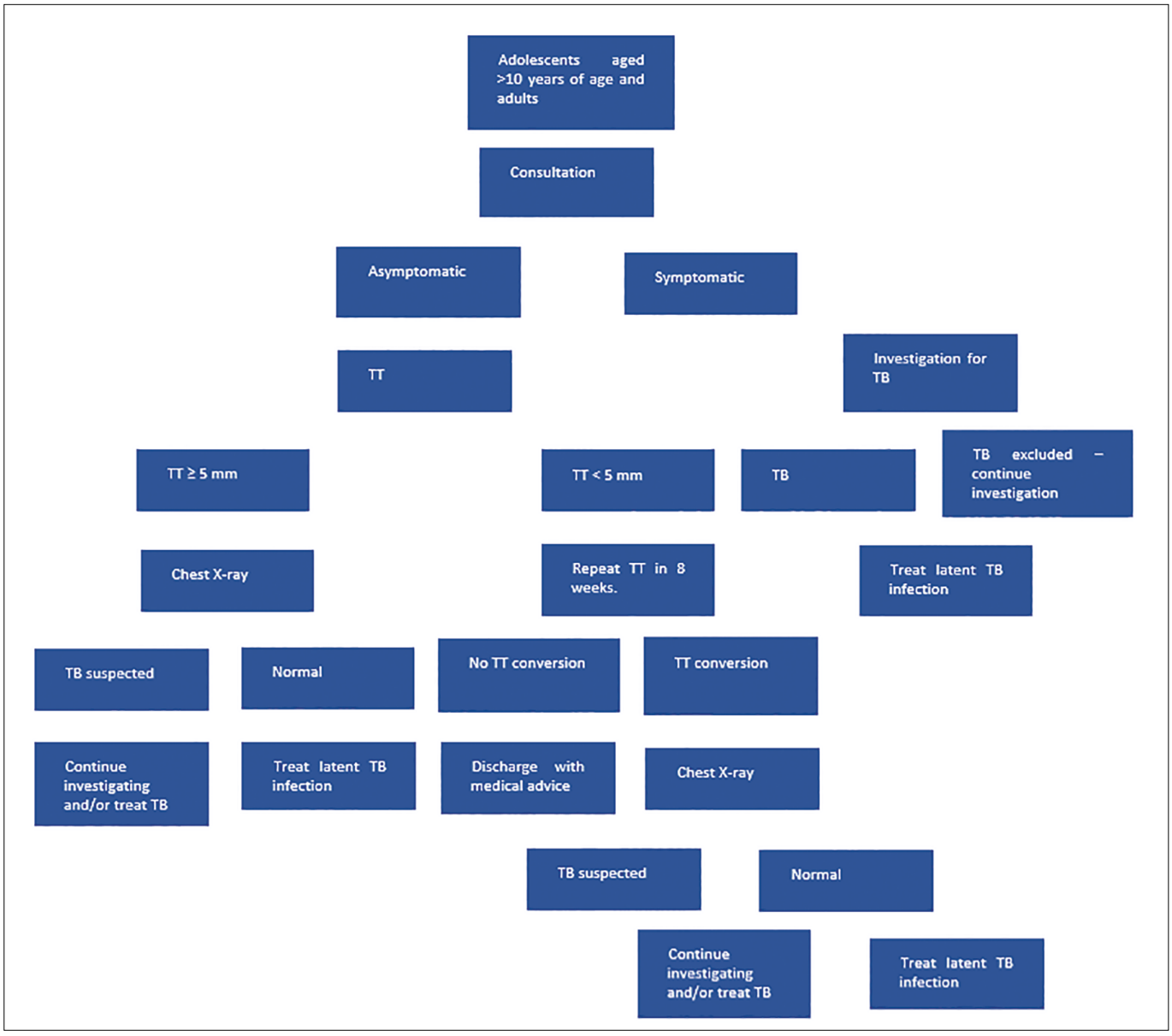


Figure 1. Fluxogram: tuberculosis contact tracing in adults and adolescents (> 10 years). Ministry of Health-Brazil, 2011.

MDR-TB is a growing problem in Brazil and worldwide, and children who come into contact with individuals with MDR-TB should be adequately managed. MDR-TB cases are caused by bacillus strains that are resistant *in vitro* to at least two drugs: isoniazid and rifampicin (RIF).

The management of TB contacts by reference centers is variable because few studies have evaluated this subject. However, the WHO advises against the use of isoniazid (IPT). In the city of Rio de Janeiro, in cases in which active TB is ruled out, follow-up is done monthly for 2 years and includes complete clinical and radiological evaluation at 6-month intervals[12]. The WHO recommends a follow-up of asymptomatic children at 2 to 3-month intervals in the first 6 months, and then at 6-month intervals for up to 2 years[13,14].

III. BCG

- What should be the approach to children without BCG scars?

The BCG vaccine protects children against the most severe forms of TB, including TB meningitis or disseminated TB, but does not prevent infection. To date, it is the best strategy for the treatment of *primary infection with M. tuberculosis*[1,15,16].

The BCG vaccine is indicated for newborns in the maternity ward or in their first visit to a healthcare unit and in children aged ≤ 4 years, preferably < 1 year. It is contraindicated for children weighing < 2 kg and those with clinical manifestations of AIDS. It is also contraindicated for

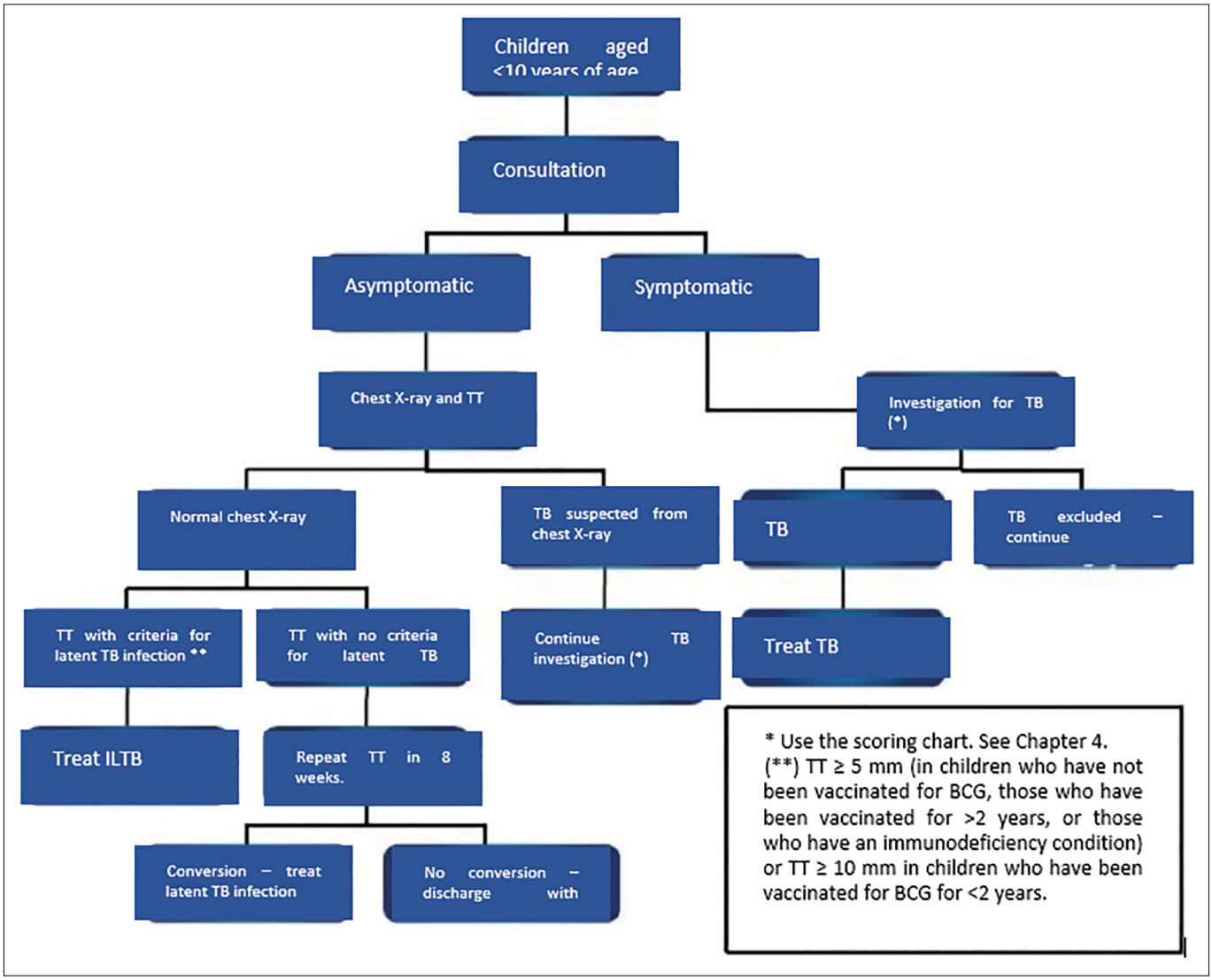


Figure 2. Flowchart for evaluating children aged < 10 years of age. Source: Recommendations Manual for Tuberculosis Control in Brazil, Brazilian Ministry of Health, Brasília, 2011. Note: * Employ the scoring chart (see the chapter titled "Diagnostics"). **TT ≥ 5 mm (in children who have not been vaccinated for BCG, those who have been vaccinated for >2 years, or those who have an immunodeficiency condition) or TT ≥ 10 mm in children who have been vaccinated for BCG for < 2 years.

children infected with HIV and those with other congenital or acquired immunodeficiencies[1,16,17].

The natural evolution of the skin reaction to the vaccine (from a papule to a scar, followed by the stages of pustule, ulcer, and crust) should be followed up for 6 months. This reaction usually occurs in the first few weeks after vaccination but may start several months later. For this reason, it is advisable to wait 6 months after vaccination to confirm the absence of scars. In such cases, the infant should be considered not vaccinated, and revaccination is indicated. In rare cases, even after the administration of a second BCG dose, the post-vaccination skin reaction does not occur and BCG scars are not formed, the child is considered vaccinated in these cases. This situation can be confirmed when there are two indications of BCG vaccination in the child's vaccination record[1].

IV. Diagnosis

- When should TB be suspected in children? What are the diagnostic criteria?
- How should RS patients be managed?
- Should TB be suspected in children with repetitive pneumonia?
- From what age can a child be bacilliferous?
- How should TB be investigated in children with HIV and AIDS?

The diagnosis of TB in children can be challenging because it is often overlooked or neglected considering its nonspecific signs and symptoms. Therefore, many opportunities to diagnose and prevent the disease are missed[3,5].

The following symptoms are usually observed in primary TB: fever, anorexia, weight loss or lack of weight gain, asthenia, irritable mood, and night sweating. Some cases do not present with cough or other respiratory symptoms. In other cases, the symptoms may be mistaken for pneumonia, bronchial asthma, pertussis, or bronchiolitis. Arthralgia, erythema nodosum, and phlyctenular keratoconjunctivitis, which are correlated with *M. tuberculosis* hypersensitivity, are rare[3,5].

In most cases, moderate fever is common, persists for > 15 days, and usually occurs in the late afternoon. Night sweating is common and sometimes profuse whereas hemoptysis is rare. TB is usually suspected in cases of pneumonia that do not improve with the use of antimicrobial drugs for common pathogens[1,3,5,18].

As childhood ends and adolescence starts (age ≥ 10 years), the clinical forms are similar to those found in adults. The lesions are larger, located in the superior thirds of the lungs, excavated, and bilaterally disseminated. The patients usually have respiratory symptoms[17].

Radiological findings in pulmonary TB in children are highly variable. The most suggestive findings are hilar or paratracheal lymphadenopathy (enlarged mediastinal ganglia), slowly-progressing pneumonia with radiological aspects, sometimes associated with mediastinal lymphadenopathy and sometimes evolving with cavities[1,13].

Another potentially helpful resource in the diagnosis of TB is TT using PPD) according to the Mantoux reaction. Brazil uses PPD r*eset tuberculin 23 (RT-23*) produced in Denmark. The product is obtained from a filtrate of seven *M. tuberculosis* strains; the filtrate is sterilized and concentrated in the liquid form[1,13].

Since 2014, there has been a worldwide shortage of PPD when the industrial division of the Danish Staten Serum Institut was spun off and privatized, subsequently resulting in drastic reduction in the production and distribution of PPD across the globe. Several countries have been claiming for a normalization of PPD distribution. Brazil has overcome the PPD shortage with difficulty. Distribution is expected to be normalized in 2018.

Primary TB is diagnosed in children by investigating the TB-infected adults they were in contact with, as described in item II "CONTACTS." Because TB diagnosis in children is difficult and most cases are not bacilliferous, many diagnostic tests use scoring systems to facilitate the management of suspicious cases. In Brazil, the Ministry of Health adopts a highly sensitive and specific score system for TB diagnosis (Table 1)[1,11,13].

Small children cannot produce sputum samples, and most of them will have negative results when any of the available bacteriological tests is performed because of the small bacillary load. However, a negative result in these tests does not rule out TB. Children aged ≥ 6 years can expectorate and therefore may be bacilliferous. However, the literature indicates that most bacilliferous patients are aged ≥ 8 years.

In the absence of accessible sensitive tests that are not based on sputum samples, a reliable diagnosis can be made using a punctuation score (Table 1)[1,13].

HIV-infected children should be monitored from an immunological standpoint because the susceptibility to infections, including TB, is increased in cases in which immunity is low and not under control[4].

The initial approach to HIV-infected children should include TT, and this test should be executed annually as long as the patient has a reading of < 5 mm. When the induration is ≥ 5 mm, oral isoniazid (INH) is indicated at a single daily dose of 10 mg/kg/day (maximum dose: 300 mg/day) for 6 months after ruling out active TB[4].

There is evidence that a 9-month treatment protects HIV-infected individuals for > 6 months. In addition, the number of doses is more important than treatment duration. Therefore, 180 doses are recommended in 6-9-month treatments or 270 doses in 9-12-month treatments. The risks and benefits of longer treatment should be weighed, and treatment adherence should be determined. In patients eligible for highly active antiretroviral therapy, TT should also be part of the initial evaluation[4,13,14].

The same procedure should be followed in cases in which an HIV-infected child comes into contact with a TB patient, usually a bacilliferous adult. Special care should be taken with co-infection because it is known that, in such cases, one disease worsens the other. Therefore, IPT is started while active TB is ruled out by physical examination, chest X-ray, TT, and rapid molecular test (RMT or GeneXpert)[1,4]. Other drugs are combined in the treatment regimen if active TB is confirmed.

V. Complementary tests

RMT

- What is RMT?
- How should RMT be ordered? Which centers perform RMT?
- Does RMT replace PPD?
- What is the history of RMT use in Brazil?

GeneXpert MTB/RIF is a molecular test used to complement TB diagnosis. It is based on the amplification of a small amount of DNA of an organism (in this case, *M. tuberculosis*) using polymerase chain reaction (PCR)[19-21].

The GeneXpert MTB/RIF system simplifies molecular testing by integrating all three processes needed for PCR (sample preparation, amplification, and detection). The test has high sensitivity and specificity and is believed to produce faster and more precise results than PPD[19,22].

In a meta-analysis of studies involving children and adolescents, the sensitivity of RMT in bacilloscopy-negative respiratory samples, including expectorated or induced sputum, was 62% (95% confidence interval: 51%-73%) and the

Table 1. Diagnosis of pulmonary tuberculosis in children and adolescents (bacilloscopy-negative).

Clinical and radiological picture		Contact with a tuberculosis-infected adult	Tuberculin test	Nutritional state
Fever or symptoms such as cough, adynamia, expectoration, weight loss, sweating for >2 weeks 15 pts	Hilar or miliary-pattern lymphadenopathy Condensation or infiltrate (with or without excavation) unchanged for > 2 weeks Condensation or infiltrate (with or without excavation) for > 2 weeks, worsening or not improving with antibiotics for common pathogens 15 pts	Close, within the last 2 years 10 pts	≥ 5 mm in individuals not vaccinated with BCG or individuals vaccinated before ≥ 2 years or immunosuppressed patients or ≥ 10 mm in patients vaccinated before < 2 years 15 pts	Severe malnutrition 5 pts
Absence of symptoms or presence of symptoms for < 2 weeks 0 pts	Condensation or infiltrate (any kind) for < 2 weeks - 5 pts	Occasional or none 0 pts	0 - 4mm 0 pts	0 pts
Respiratory infection that spontaneously improves or after use of antibiotics for common pathogens - 10 pts	Normal X-ray 0 pts			
Interpretation:	≥ 40 points: TB diagnosis is very likely	30-35 points: TB diagnosis is possible.	≤ 25 points: TB is unlikely	

Note: pts = points; this interpretation does not apply to patients who have been revaccinated with BCG.
Fonte: Brazilian Ministry of Health, 2011[1]

specificity was 98% (CI: 97%-99%). In gastric lavage samples, the sensitivity was 66% (CI: 51%-81%) and specificity was 98% (CI: 96%-99%)[1,22].

This method allows the real-time laboratory detection of *M. tuberculosis* and identification of resistance to RIF using the rpoB gene in 2 h. Children with a high clinical suspicion of TB should be treated in cases in which GeneXpert is negative or unavailable (Table 2)[23-25].

In 2012, the Brazilian Ministry of Health conducted an RMT-TB trial in the cities of Rio de Janeiro and Manaus. The test was incorporated into routine tests in other cities using the following criteria: number of cases of > 200 and selection of municipalities based on epidemiological data (those with large prison or indigenous populations and some border cities). Only 60 municipalities account for 56% of all new TB notifications in Brazil. The reference centers for TB programs at the municipal and state levels can provide information about the centers that perform the test.

The network of centers that perform RMT-TB was implemented by the Brazilian Ministry of Health to improve the efficacy of TB diagnosis and early detection of resistance to RIF. Doubts about new tests for detecting TB infection are expected because the network is recent.

However, the diagnostic sensitivity of RMT-TB in children aged < 10 years is lower than that in adults. Therefore, in cases in which the results are negative (MTB is not detected), the clinical score described in the *Recommendations Manual for Tuberculosis Control in Brazil* should be used for diagnosis.

Brazil started using RMT-TB as a diagnostic tool in May 2014. Shortly after that, the network of centers using this instrument started to be monitored. Later, the Ministry of Health issued Opinion CGPNCT/DEVEP/SVS/MS 09/2014, which contained nationwide recommendations for using RMT-TB, making cultures using a rational and comprehensive approach, performing sensitivity tests, and performing clinical management of TB in tertiary-level reference centers[26].

The most important recommendations were[26]

- If a patient tests positive for TB but negative for resistance to RIF, a culture and an antimicrobial susceptibility test (AST) should be performed, and TB treatment should be initiated.
- If a patient tests positive for TB and resistance to RIF, another RMT-TB, bacterial culture, and AST should be performed, and the patient should be referred to a tertiary-level reference center, i.e., a facility specialized in treating drug-resistant TB.
- If a patient tests negative, the diagnosis of TB is ruled out.

Therefore, the coordination of the Brazilian National Program for Tuberculosis Control considers that implementing the RMT-TB network is an effective strategy in the fight against TB. However, this strategy is challenging because the network needs to be expanded and improved[10].

Table 2. Characteristics, advantages, and disadvantages of the rapid molecular test (RMT).

Nucleic acid amplification techniques	
GeneXpert MTB/RIF or RMT	
Advantages and disadvantages	Indications in childhood
• Detects *M. tuberculosis* DNA and resistance to RMP • Sensitivity is 2-3 × higher than that of bacilloscopy • 97% specificity • Detects 75% more cases than culture	• Specimens: sputum, CSF, gastric lavage, aspirates (e.g., lymph node) • Low sensitivity for pleural fluid • Superior to bacilloscopy and culture for CSF

Source: WHO, 2014[11]

Tuberculin test with PPD

- How to interpret TT (PPD) in children vaccinated with BCG?
- Why is there a PPD shortage in Brazil and other countries?

The classification of TT (PPD) into non-reactive, weakly reactive, and strongly reactive is no longer adopted. According to the norms of the Brazilian Ministry of Health, TT can be interpreted as suggestive of *M. tuberculosis* infection in cases in which the reading is ≥ 5 mm in children not vaccinated with BCG, in children vaccinated > 2 years before TT, or in children with immunosuppression. In children who were vaccinated < 2 years before TT, a PPD reading of ≥ 10 mm is considered suggestive of TB infection[1,12].

These parameters are included in the contact flowcharts for children aged < 10 years and adolescents.

TT is effective in TB diagnosis. However, as of 2017, the Brazilian government has not bought PPD, used to diagnose LTBI, in the past 3 years[19].

LTBI diagnosis is limited in Brazil because the Danish supplier has reduced PPD production since June 2014. However, normalization of production is expected. According to the Ministry of Health, TT is a complementary test in TB diagnosis. In the absence of TT, an alternative quick test is needed to detect TB infection such as the interferon-gamma release assay.

This *in vitro* test has advantages and disadvantages compared with PPD. The disadvantages include high cost for mass utilization and need of laboratory personnel with specialized training. Moreover, this assay is not indicated for children aged < 2 years. The advantages include sensitivity similar to that of PPD and high specificity. Furthermore, in contrast to TT, the tested individuals do not need to return for reading after 72 h.

Imaging

• What role do chest computed tomography scans play in TB investigation and follow-up in children?

High-resolution computed tomography, magnetic resonance, and positron-emission tomography are imaging technologies that have been proposed for diagnosing both active TB and LTBI and may help diagnose extrapulmonary or atypical pulmonary TB. However, except in such cases, they are not indicated for routine TB diagnosis in Brazil[1,27].

VI. Treatment

- Has TB treatment changed for children?

The treatment scheme has changed for adolescents, for whom the Brazilian Ministry of Health recommends four drugs, starting at the age of 10 years. For children aged < 10 years, three drugs are recommended (Tables 3 and 4)[1,13,28].

- How to provide isoniazid to infants considering it is only available in tablets?

Isoniazid (INH) should be started at a dose of 10 mg/kg/day for 6 months. As INH is distributed in 100mg tablets, it is necessary to macerate the tablet, dilute it in water, and determine the volume to be administered to the infant by a rule-of-three calculation based on the infant's weight[1]. It has been reported that isoniazid may be available as dispersible tablets in the future.

- What is the paradoxical reaction in TB treatment?

In many cases, TB increases the viral load and reduces the $CD4^+$ T-cell count in HIV-infected individuals. The recommendation is to initiate TB treatment, wait for clinical stabilization, and then assess the indication for antiretroviral therapy.

A paradoxical worsening of TB, with the appearance of symptoms or radiologically determined worsening, may occur with the start of antiviral therapy because of immune restoration syndrome[29].

VII. Newborns who come into contact with bacilliferous adults

- What should be done when a newborn lives with a bacilliferous adult?

Primary chemoprophylaxis is indicated in individuals who have not been infected. It is used in newborns who live with bacilliferous adults. In this case, the newborn is not vaccinated with BCG shortly after birth and undergoes a different therapy.

Bacilliferous mothers should wear a mask when breastfeeding.

A newborn who is in contact with a mother with TB should receive primary chemoprophylaxis with INH for 3 months, and in sequence, undergo a PPD test. If the reading is < 5 mm, INH should be suspended and intradermal BCG should be given.

If the reading is ≥ 5 mm, INH should be used until the newborn reaches 6 months of age. In this case, BCG vaccination is not recommended after chemoprophylaxis is finished[13].

Considering the current PPD shortage and difficulty performing the test, primary chemoprophylaxis should last 6 months, and BCG vaccination is indicated after that[6,13].

VIII. Health professionals

- What should the preventative measures be and what care should be taken by health professionals who work with TB patients?

Individual protection measures

Respirator masks should be used judiciously when caring for RS or TB patients. The masks recommended for health professionals, visitors, and visit companions are the PFF2 type (Brazilian and European Union standard) and N95 (United States standard). The areas with the highest risk of transmission are respiratory isolation rooms and specialized outpatient clinics for referred RS or bacilliferous patients, and TB patients with suspected or confirmed drug resistance[1].

The use of respirator masks is recommended for patients with pulmonary or RS TB in situations of potential risk of transmission, including cases in which ventilation in waiting and emergency rooms is inadequate, a definite diagnosis has not been made, and patients are moved from isolation rooms to undergo tests or procedures.

The use of respirator masks by health professionals only during consultation has limited effectiveness because the

Table 3. Basic treatment scheme for TB in adolescents (aged > 10 years)

Regimen	Drugs	Weight range (kg)	Unit/dose
2 RHZE Intensive phase (2 months)	RHZE 150/75/400/275 Single tablet with a fixed combined dose	20-35kg	2 tablets
		36-50kg	3 tablets
		> 50kg	4 tablets
4 RH Maintenance phase (4 months)	RH Tablets or capsules with 300/200 mg or 150/100 mg, or tablets with 150/75 mg	20-35kg	1 tablet or capsule with 300/200 mg or 2 tablets with 150/75 mg each
		36-50kg	1 tablet or capsule with 300/200 mg + 1 tablet or capsule with 150/100 mg or 3 tablets with 150/75 mg each
		> 50kg	2 tablets or capsules with 300/200 mg or 4 tablets with 150/75 mg each

Source: Brazilian Ministry of Health, 2011[1]

Table 4. Basic treatment scheme for TB in children (aged < 10 years)

Treatment phase	Drug	Patient weight (kg)			
		Up to 20 mg/kg/day	21-35 mg/day	36-45 mg/day	> 45 mg/day
First phase - Loading (2 months - RHZ)	R	10	300	450	600
	H	10	200	300	400
	Z	35	1000	1500	2000
Second phase - Maintenance (4 months - RH)	R	10	300	450	600
	H	10	200	300	400

Source: Brazilian Ministry of Health, 2011[1]

bacilli may remain in the room for up to 9 h after the patient has left, depending on ventilation and lighting conditions.

Respirator masks can be reused, provided they are intact and dry[1].

Secondary prevention (LTBI treatment) is indicated for recently infected health professionals, diagnosed by TT status conversion. Health professionals with TB-compatible signs or symptoms should seek medical help and undergo laboratory tests and chest X-ray. Until TB diagnosis is ruled out or the professional is no longer contagious in cases of pulmonary TB, the professional should be dismissed from work activities[1].

CONCLUSION

Questions about TB diagnosis, particularly in children, were present in all examined congresses. The questions were related to clinical evaluation, chest X-ray, diagnostic tests, and interpretation of TT. The score tables are the most widely used diagnostic method for children and adolescents without bacteriological confirmation and doubts were raised on them.

Moreover, there were doubts about contact history and BCG vaccination. The treatment scheme for adolescents has changed according to the latest norms of the Brazilian National Program for Tuberculosis Control, and therefore, questions were raised on this topic as well.

It can be concluded that it is necessary to prioritize actions for training health professionals, and such actions must be permanent and focused on primary care. Disease surveillance actions must involve pediatricians, as well as family and community physicians, attempting to achieve a greater impact on the priority population groups, to bring a decline in the morbidity and mortality curves for tuberculosis in children.

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