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Controversies in tuberculous infection among pediatric infectious disease specialists in North America

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SUMMARY

OBJECTIVE: To evaluate the extent to which advancements in the diagnosis and treatment of latent tuberculous infection (LTBI) have been integrated into practice by pediatric infectious disease (PID) specialists.

DESIGN: We conducted an online survey of the Infectious Diseases Society of America's Emerging Infections Network (EIN) membership.

RESULTS: Of the 323 members, 197 (61%) responded: 7% cared for ⩾5 children with TB disease and 34% for ⩾5 children with LTBI annually. We identified substantial variations in the use of interferon-gamma release assays (IGRAs) based upon age, immune status, and TB risk factors. In addition, tuberculin skin test (TST) use was three times more common in younger children. Variations existed in managing children with discordant TST and IGRA results. Less variation existed in LTBI treatment, with 86% preferring a 9-month course of isoniazid; few other, newer regimens were used routinely.

CONCLUSION: Substantial variations exist in LTBI management; uptake of newer diagnostic tools and treatment regimens has been slow. Variations in practice and the lag time to integrating new data into practice may indicate the relative infrequency with which providers encounter LTBI. Our findings reflect the need for increased visibility of existing TB guidelines and resources for expert consultation for scenarios not covered by guidelines.

KEY WORDS: interferon-gamma release assay (IGRA); practice variation; treatment regimens

TREATMENT FOR LATENT TUBERCULOUS infection (LTBI) is safe and efficacious in children. However, its effectiveness has been limited by poor adherence.[1,2] The introduction of more specific diagnostic tools,[3–5] shorter treatment regimens,[6,7] and a more systematic approach to testing recently arrived immigrant and refugee children[8] offers the opportunity to improve the identification and treatment of children with LTBI.

The first commercially available interferon-gamma release assay (IGRA) was licensed in the United States in 2005. Use of IGRAs was initially hampered by limited pediatric data.[9] In recent years, more data have been published on pediatric IGRA performance.[10–13] However, integration of IGRAs into pediatric practice has been variable.

Knowledge of new pediatric-specific data is critical in the selection of treatment regimens. Nine months of isoniazid (9INH) has been widely used for the treatment of LTBI in the United States since the 1950s. Despite operational experience in using shorter course, well-tolerated, rifamycin-based regimens[6,7] with higher completion rates, most clinicians continue to use 9INH. Several patient, family, and provider-level barriers to and facilitators of successful completion of LTBI treatment have been documented. For example, parental region of origin in Asia and Eastern Europe has been associated with failure to complete treatment. In contrast, the identification of LTBI as part of a health department contact investigation, parental country of origin in Africa or Latin America, and receipt of medication under directly observed therapy (DOT) have been associated with increased rates of treatment completion.[1,2,14,15] The degree to which this knowledge has influenced the use of new LTBI regimens is unclear.

The goal of the present study was to assess practice variations among pediatric infectious disease (PID) clinicians in the diagnosis and treatment of LTBI and to identify areas where subspecialists suggest more data are needed to guide management decisions.

STUDY POPULATION AND METHODS

Study design and population

An online confidential 14-question survey (http://ein.idsociety.org/surveys/survey/89/) was distributed dur-

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ing the month of November 2015 to pediatric members of the Emerging Infections Network of the Infectious Diseases Society of America (IDSA EIN).[16] This network of 349 PID specialists represents approximately 21% of all US PID board-certified physicians. Its mission is to assist public health authorities in gathering information on evolving infections and diagnostics.

Data collection

Demographic questions about practice location and experience managing children with TB were included. Vignettes explored IGRA use in children of different ages, comorbidities, TB exposures, and bacille Calmette-Guérin (BCG) vaccine status. Questions referring to positive tuberculin skin test (TST) or IGRA results used American Thoracic Society (ATS), IDSA, and Centers for Disease Control and Prevention (CDC) definitions for interpretation.[9,13,17] We asked about routine treatment of children with LTBI and treatment of LTBI in child contacts of adults with multidrug-resistant TB (MDR-TB). We queried respondents about the use of traditional (9INH) and newer (12 once-weekly doses of INH and rifapentine, 3HP) CDC-approved regimens.[6] Finally, we asked participants what resources they accessed to seek guidance on TB management. Face and content validity were evaluated by piloting the study before distribution. The study was exempt from institutional review board approval as the data were de-identified.

Data analysis

For the purposes of calculating response rate, the denominator was the 323 PID EIN members who had ever responded to an EIN survey, a standard methodology that had been used in previous EIN surveys.[18] Respondents who reported that they saw no children with either LTBI or TB disease were excluded from further analyses. As there was no single correct answer for most questions, percentages of responses were reported. The small numbers of providers in different regions and with differing levels of TB experience precluded subgroup analyses. For comparisons of testing and treatment strategies, management strategies were dichotomized and analyzed using χ^2 tests. Stata, version 11 (StataCorp, College Station, TX, USA) was used for data analyses.

RESULTS

Characteristics of the study population

Of 323 active PID specialist members, 197 (61%) responded. The demographic characteristics are given in Table 1. The demographics of the respondents and non-respondents did not differ significantly. Only 7% provided care for at least five children with TB disease and 34% for at least five children with LTBI annually. Thirty-one (16%) respondents reported providing care for no children with LTBI or TB disease. These 31 respondents and 3 of the 10 respondents who reported seeing no children with TB disease and $\leqslant 5$ with LTBI annually who did not complete the questionnaire were excluded from subsequent analyses. The maximum possible denominator for subsequent analyses was thus 163.

Table 1 Demographics of survey participants

Category	Subcategory	*n/N* (%)*
Geographic region		
	New England	11/16 (69)
	Mid Atlantic	29/42 (69)
	East North Central	29/44 (66)
	West North Central	14/28 (50)
	South Atlantic	34/56 (61)
	East South Central	14/23 (61)
	West South Central	13/20 (65)
	Mountain	11/24 (46)
	Pacific	39/63 (62)
	Canada	3/7 (43)
Years of post-fellowship experience, years		
	<5	51/78 (65)
	5–14	64/121 (53)
	15–24	43/64 (67)
	⩾25	39/60 (65)
Employment		
	Hospital/clinic	51/78 (58)
	Private/group practice	19/30 (63)
	University/medical school	118/187 (63)
	Military	1/2 (50)
	State government	1/3 (33)
Type of primary hospital		
	Community	12/25 (48)
	Non-university teaching	61/94 (65)
	University	120/196 (61)
	Federal/military	2/4 (50)
	City/county	2/4 (50)
Experience with tuberculous infection*		
	No cases annually	32 (16)
	1–5/year	99 (50)
	1–5/month	52 (26)
	5–20/month	10 (5)
	>20/month	4 (2)
Experience with TB disease*		
	No cases annually	43 (22)
	1–5/year	140 (71)
	1–5/month	12 (6)
	5–20/month	2 (1)
	>20/month	0

* Number of respondents/total number in each category. Percentages were calculated based on the number of respondents ($n = 197$) for each question. Percentages may not sum up to 100% due to rounding. Three of the 10 respondents who reported that they saw no children with TB disease and very few with infection did not answer subsequent questions.
TB = tuberculosis.

IGRA utilization

IGRA use varied widely across providers (Table 2). There was variation in use based on the child's age, with a minority (7%) of providers using IGRAs in all age groups and in infants (6%). Approximately one quarter felt comfortable with using IGRAs beginning in each of the following age brackets: 2–3 years, 4–5 years, and >5 years. When presented with a scenario for the best test of infection for children exposed to a family member with pulmonary TB,

Table 2 Use of IGRAs*

Question	Response	*n* (%)
Youngest age at which you routinely use IGRAs	Do not routinely use IGRAs	15 (9)
	Routinely used IGRAs in all ages	12 (7)
	1 year	9 (6)
	2–3 years	40 (25)
	4–5 years	39 (24)
	>5 years	48 (29)
In an immunocompetent school-aged child who has not received the BCG vaccine, is there a TST induration above which you would not obtain an IGRA?†	⩾15 mm	75 (46)
	⩾20 mm	15 (9)
	Other TST size (10, 25 mm)	6 (4)
	I would obtain an IGRA in all such children, regardless of TST size	45 (28)
	I do not obtain IGRAs in my practice	8 (5)
	Unsure	13 (8)
Which test of infection would you use for the following children?		
10-year-old US-born child with Crohn's, on steroids, about to start TNF-α antagonist therapy	TST only	15 (9)
	IGRA only	59 (37)
	Both TST and IGRA	81 (51)
	Tiered testing‡	5 (3)
3-year-old US-born child, mother recently diagnosed with pulmonary TB	TST only	99 (61)
	IGRA only	5 (3)
	Both TST and IGRA	45 (28)
	Tiered testing‡	14 (8)
15-year-old US-born child, mother recently diagnosed with pulmonary TB	TST only	52 (32)
	IGRA only	62 (39)
	Both TST and IGRA	32 (20)
	Tiered testing‡	15 (9)
1-year-old BCG-vaccinated immigrant from India	TST only	75 (46)
	IGRA only	25 (15)
	Both TST and IGRA	26 (16)
	Tiered testing‡	37 (23)
6-year-old BCG-vaccinated immigrant from India†	TST only	14 (9)
	IGRA only	100 (62)
	Both TST and IGRA	22 (13)
	Tiered testing‡	26 (16)

* Percentages may not sum to 100% due to rounding. Questions had 163 respondents unless otherwise specified.
† 162 respondents.
‡ Refers to use of a TST and then performing an IGRA only in children with positive TST results.
IGRA = interferon-gamma release assay; BCG = bacille Calmette-Guérin; TST = tuberculin skin test; TB = tuberculosis; TNF = tumor-necrosis factor.

providers were more likely to perform a TST as a stand-alone test for younger children (age <5 years) than for older (adolescent) children (odds ratio [OR] 3.2, 95% confidence interval [CI] 2.1–5.1). The same finding was noted for testing immigrant children from high-prevalence settings, where use of a TST alone was more common for infants (OR 9, 95%CI 4.8–16.9).

There was no consensus for the TST induration above which providers would *not* obtain an IGRA. Almost 50% of the respondents stated that they would obtain IGRAs in children with TST results of ⩾15 mm induration. However, as TST induration increased to ⩾20 mm, fewer providers (9%) reported that they would obtain IGRAs. Over one quarter of respondents stated that their decision to perform an IGRA was irrespective of TST size. The test of choice for an immunosuppressed child before starting tumor necrosis factor-alpha (TNF-α) antagonist therapy varied, with few (9%) providers feeling comfortable relying on the TST alone and almost 90% using an IGRA, either alone or in combination with a TST, to identify LTBI in this high-risk group.

Variation also existed in the management of children with discordant TST and IGRA results (Appendix Table A).* For BCG-immunized children in whom IGRA results were negative and TST results were positive, providers were more likely to treat for LTBI if the children were younger (OR 2.8, 95%CI 2–3.9) or had larger TST indurations (OR 3.4, 95%CI 2.4–4.8). When asked about managing an immunocompromised child with a 0 mm TST and a weakly positive IGRA, 52% of providers said they would treat for LTBI and 33% reported that they would treat only if the child had other risk factors for LTBI. Few providers (5%) would opt not to treat for LTBI.

Practice patterns did not vary by practice setting or time since fellowship, except for the evaluation of young, BCG-immunized children. In this scenario, providers in non-academic settings were more likely to use the TST ($P = 0.0098$), whereas those in academic settings used IGRAs alone or together with the TST.

*The appendix is available in the online version of this article, at http://www.ingentaconnect.com/content/iuatld/ijtld/2016/00000020/00000011/art00009

Table 3 Treatment of latent tuberculous infection*

Question†	Response	*n* (%)
How would you treat a 3-year-old US-born child for tuberculous infection?	INH for 9 months	140 (86)
	RMP for 4 months	1 (0.6)
	RMP for 6 months	0
	INH and RPT weekly for 12 weeks	8 (5)
	Any of the above, depends on family choice	12 (7)
	Unsure	1 (0.6)
An adolescent with Crohn's disease requires a TNF-α antagonist and has newly diagnosed tuberculous infection. How long would you treat with anti-tuberculosis medication prior to starting the TNF-α antagonist?	2 weeks	17 (10)
	1–2 months	82 (50)
	4 months	4 (2)
	⩾6 months	8 (5)
	Start at the same time	23 (14)
	Unsure	29 (18)
A high-school teacher is diagnosed with MDR-TB resistant to INH and RMP but susceptible to all other medications. Several of her students are found to have tuberculous infection (all are immunocompetent and have no travel history). How would you treat tuberculous infection presumably caused by an MDR-TB strain?	FQ monotherapy (e.g., moxifloxacin or levofloxacin)	21 (13)
	EMB + PZA	20 (13)
	FQ + (PZA *or* EMB)	44 (27)
	FQ + high-dose INH	0
	Other second-line drugs	0
	Would not treat, but would bring children back for monthly evaluation	3 (2)
	Other	14 (9)
	Unsure	58 (36)

* Percentages may not sum to 100% due to rounding.
† There were 162 respondents to the first question, 163 to the second, and 160 to the third question.
INH = isoniazid; RMP = rifampin; RPT = rifapentine; TNF = tumor-necrosis factor; MDR-TB = multidrug-resistant tuberculosis; FQ = fluoroquinolone; EMB = ethambutol; PZA = pyrazinamide.

LTBI treatment

9INH remained the standard regimen used by the majority (86%) of providers for LTBI treatment in young children (Table 3), followed by 3HP (5%). Only one provider reported using rifampin alone. There was no consensus for the optimal treatment of a child with LTBI presumably due to an MDR-TB isolate. Over one third of providers were unsure as to what they would do, and almost 40% would start the child on a fluoroquinolone-based regimen (either as monotherapy [13%] or in combination with a first-line drug, such as pyrazinamide or ethambutol [27%]). Only a minority (2%) of providers responded that they would not offer treatment. Similar variation existed when providers were asked about the optimal amount of time a child should be on LTBI treatment before initiating a TNF-α antagonist: 50% answered 1–2 months, one quarter recommended starting TNF-α antagonists within 2 weeks of starting LTBI treatment, and 7% would defer LTBI treatment for at least 4 months after starting TNF-α antagonists.

Resources utilized

Providers used a number of sources to obtain information on pediatric LTBI diagnosis and management. The most commonly used resources included the American Academy of Pediatrics' (AAP's) Red Book (92%); ATS, CDC, or IDSA guidelines (88%); colleagues (59%); state or local health departments (59%); PubMed (37%); and regional TB training and medical consultation centers (RTMCCs) (37%). Less commonly used were UpToDate® resources (25%) and online search engines (e.g., Google) (8%).

Specific challenges identified by providers

Several themes were identified when participants were asked what other questions they had about childhood TB. The most common themes related to IGRA use were lack of test availability in public health departments due to cost, interpreting indeterminate results, and more definitive guidance on IGRA use in preschool-aged children. Another theme related to difficulty in finding guidance on the optimal time during which a child should be on LTBI treatment before the initiation of TNF-α antagonists. Participants noted that guidelines in the infectious disease (vs. rheumatology) literature were difficult to find and appeared inconsistent.

DISCUSSION

Through this survey of North American PID clinicians, we identified several notable themes regarding pediatric LTBI management. First, even among PID providers in North America, most specialists cared for few children with LTBI or TB disease, and their practices varied widely. Second, adoption of new practice patterns for pediatric LTBI diagnosis and treatment appears limited, even when these practices were recommended in national guidelines. Third, when PID specialists were presented with scenarios not covered by existing guidelines, we observed even greater variations in practice. Our findings illustrate the importance of increasing the visibility of existing guidelines, the need for more research to guide management of specific clinical scenarios, and the need to make additional resources available—such as access

to clinicians with more TB-specific expertise—when guidelines do not address specific clinical situations.

The United States and Canada are low TB incidence countries, with annual incidence rates of respectively 3.1 and 5.2 per 100 000 population.[19] Of all US TB disease cases, about 6–7% occur in children,[20] and many of these cases are clustered in a small number of large metropolitan areas. It is therefore not surprising that even among PID specialists, few have extensive TB experience. It is therefore important for ID specialists to know what resources are available when existing guidelines do not address specific clinical questions. One resource that was infrequently used is the network of RTMCCs. The five RTMCCs cover all 50 states and US territories and can provide consultation with adult and pediatric TB experts. In addition, RTMCCs provide technical assistance, produce training materials, and organize educational conferences. Much of the domestic TB expertise in the United States is concentrated in this consultation network, which is meant to help providers with challenging clinical scenarios to optimize patient care.

There was marked variation in practice patterns in the diagnosis and treatment of LTBI. This was noted even for scenarios addressed in existing guidelines. For example, almost 10% of respondents stated that they did not routinely use IGRAs, despite a decade of steadily accumulating data on the advantages of IGRA use in children. In addition, almost all providers used 9INH as their first-line therapy for LTBI, despite abundant data on poor completion rates—often less than 50%—associated with this regimen.[1,2,21] These findings may simply reflect that the TST remains the preferred test for preschool-aged children and INH remains the preferred LTBI regimen in AAP guidelines.[22] There are also differences between the most recent Red Book recommendations[22] and the 2014 AAP statement;[13] future Red Book recommendations will probably more closely mirror the 2014 document. Uptake of 3HP was low by provider self-report, although this may have reflected the need for DOT for this regimen and availability only through local health departments.

There are several reasons why guideline implementation may be suboptimal. First, providers encounter these issues infrequently in their daily practice and may refer to these guidelines less often than other AAP or IDSA recommendations. Second, when they do encounter these issues, existing guidelines may not be deemed as applicable to children as to adults, as children are rarely the focus of US ID guidelines. Third, lag time to uptake of TB advancements may be worsened by the presentation of TB-specific data at meetings that are not frequently attended by PID clinicians. TB advancements are often presented either at the International Union Against Tuberculosis and Lung Disease meetings or meetings of the ATS, rather than at IDSA and AAP meetings. Incorporation of TB data at meetings attended by more PID specialists would increase the visibility of new findings. Similar variations have been noted in Europe in terms of the availability and use of tests of infection and disease among children with suspected TB.[23]

Not surprisingly, variations in practice were more pronounced in situations that are *not* covered by guidelines. Guidelines are typically intended to address the most common scenarios. Management strategies for specific populations, such as testing for LTBI in immunocompromised children or management of the child with suspected MDR-LTBI, are not included in national recommendations. However, for cases like these scenarios, pediatric ID providers are often consulted by other health care providers, and there is little consensus about what to do in some of these scenarios. The variations in practice and the provider acknowledgment of clinical uncertainty that we report shows the need for more research on LTBI diagnosis and treatment in children. This includes better data to inform optimal IGRA use. However, study findings also reflect the importance of reducing the time from discovery to integration into clinical practice.

This study has several limitations. Responses were limited to providers in the United States and Canada. While demographics of EIN respondents and non-respondents were not statistically different, there may have been differences in providers who participated in EIN and those who did not; this could have led to selection bias and a sampling that is not generalizable to all pediatric ID providers. However, respondents from countries in which IGRAs are not readily available or where LTBI treatment is not routinely offered would not have been as informative. For example, the World Health Organization does not support the use of IGRAs in low- and middle-income countries.[24] As such, the population sampled represented the target audience for uptake of newer diagnostic tests and treatment regimens. The survey response rate was 61%. This is a high rate for physicians, and consistent with previous EIN surveys.[18,25] Nevertheless, it is possible that our results may not be generalizable to all PID physicians. However, response rates were similar across provider demographic groups. Given the small numbers of ID physicians in each region, subgroup analyses were not feasible, and it was not possible to identify within- or between-region variations in practice. It is possible that responses did not reflect actual practice patterns; we attempted to avoid this by de-identifying responses. We did not ask providers what resources were available locally, as this may impact selection of regimens, how regimens would be administered (e.g., DOT) or what diagnostic tests were used. Recall bias may have been present, particularly among providers

with less experience in LTBI management. Wording of questions (e.g., routine vs. occasional IGRA use) may have impacted the responses received. We did not allow for a mechanism for respondents to explain the decisions they made for these clinical vignettes. Finally, selection bias may also have been present, with providers who had more of an interest in TB responding to the survey. However, if this were the case, variations in practice patterns would have been even more striking.

CONCLUSIONS

Substantial variation exists in LTBI management among North American PID specialists. Integration of newer diagnostic tools and treatment regimens is slow. Some of this variation may be in accordance with current guidelines, but some variation may be attributable to the relative infrequency with which most PID physicians encounter TB in routine practice. Our results highlight the need for improved visibility for pediatric LTBI guidelines and existing consultation resources. These resources will be especially important as declining US TB incidence rates may translate into many specialists having even less experience in managing childhood TB.

Conflicts of interest: none declared.

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APPENDIX

Table A Management of discordant results between TSTs and IGRAs in asymptomatic children with normal chest radiographs

Scenario	Treat for LTBI, no further testing *n* (%)	Do not treat for LTBI *n* (%)	Treat for LTBI only if other risk factors present *n* (%)	Other *n* (%)
Foreign-born, BCG recipient with negative IGRA and:				
1 year old, 12 mm TST	103 (64)	16 (10)	31 (19)	12 (7)
1 year old, 25 mm TST	138 (85)	6 (4)	10 (6)	8 (5)
15 year old, 12 mm TST	55 (34)	58 (36)	40 (25)	9 (5)
15 year old, 25 mm TST	110 (68)	20 (12)	22 (14)	10 (6)
10 year old, US-born, immunocompromised child with 0 mm TST and a weakly positive QuantiFERON (0.5; positive is $\geqslant$0.35 IU/l)	82 (52)	7 (5)	52 (33)	16 (10)

TST = tuberculin skin test; IGRA = interferon-gamma release assay; LTBI = latent tuberculous infection; BCG = bacille Calmette-Guérin.

RESUME

OBJECTIF : Evaluer dans quelle mesure les progrès du diagnostic et du traitement de l'infection tuberculeuse latente (LTBI) ont été intégrés dans la pratique par les spécialistes des maladies infectieuses pédiatriques (PID).
SCHÉMA : Nous avons réalisé une enquête en ligne auprès des membres de la société des maladies infectieuses du réseau des infections émergentes d'Amérique (EIN).
RÉSULTATS : De 323 membres, 197 (61%) ont répondu : 7% soignaient ⩾5 enfants atteints de tuberculose maladie et 34% ⩾5 enfants avec une LTBI chaque année. Nous avons identifié une variation considérable dans l'utilisation des tests de libération de l'interféron gamma (IGRA) en fonction de l'âge, de l'état immunitaire et des facteurs de risque de TB. De plus, l'utilisation du test cutané à la tuberculine (TST) a été trois fois plus fréquente chez les jeunes enfants. Il y a également eu une variation dans la prise en charge des enfants ayant des résultats discordants du TST et de l'IGRA. Il y a eu moins de variation en matière de traitement de LTBI, 86% des praticiens préférant un traitement par isoniazide de 9 mois et quelques-uns recourant en routine à des protocoles plus récents.
CONCLUSION : Il existe une variation substantielle de la prise en charge de TBI ; le recours aux nouveaux outils de diagnostic et aux nouveaux protocoles de traitement a été lent. La variation des pratiques et le délai d'intégration des nouvelles données dans la pratique pourraient témoigner d'une relative rareté de la confrontation des prestataires de soins à TBI. Nos résultats reflètent le besoin d'une meilleure visibilité des directives TB existantes et des ressources en matière de consultation d'experts pour les cas qui ne sont pas couverts par les directives.

RESUMEN

OBJETIVO: Evaluar en qué medida los especialistas de las enfermedades infecciosas pediátricas (PID) han integrado a su práctica clínica los progresos en el diagnóstico y el tratamiento de la infección tuberculosa latente (LTBI).
MÉTODO: Se realizó una encuesta en línea a los miembros de la red de infecciones emergentes de la *Infectious Diseases Society of America*.
RESULTADOS: Se obtuvo respuesta del 61% de los miembros (197/323). Cada año, el 7% de los miembros atendía ⩾5 niños con enfermedad tuberculosa activa y el 34% atendía ⩾5 niños con LTBI. Se observó una gran variabilidad en materia de utilización de las pruebas de liberación de interferón gama (IGRA), en función de la edad, la situación inmunitaria y los factores de riesgo de padecer tuberculosis. Además, el recurso a la prueba cutánea de la tuberculina (TST) fue tres veces más frecuente con los niños menores. Hubo diferencias en el tratamiento de las discordancias entre los resultados de TST y de IGRA Se observó menor variabilidad en el tratamiento de la LTBI, pues el 86% de los profesionales prefería un régimen de 9 meses con isoniazida; se utilizaron muy pocos tratamientos nuevos diferentes de manera sistemática.
CONCLUSIÓN: Existe una gran variabilidad en el manejo de la LTBI; la adopción de nuevos medios diagnósticos y nuevos regímenes terapéuticos ha sido muy lenta. La amplitud de variación en las prácticas y el período de latencia de la integración de nuevos datos en la práctica clínica podría corresponder a la relativa infrecuencia de casos de LTBI que atienden los profesionales. Estos resultados destacan la necesidad de mejorar la visibilidad de las directrices existentes en materia de tuberculosis y de los recursos dirigidos a los expertos, sobre las situaciones que no se cubren en las recomendaciones.