



Adolescent Tuberculosis: Epidemiologic and Clinical Characteristics

Andrea T. Cruz, MD, MPH
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Andrea T. Cruz, MD, MPH

Has the following disclosures to make:

- I have no disclosures or conflicts of interest relevant to this topic to report
- I write 4 chapters for UpToDate (on nontuberculous mycobacterial infections)
- I am the deputy editor of *Pediatrics*

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Andrea T. Cruz, MD, MPH
Professor of Pediatrics
Sections of Infectious Diseases and Emergency Medicine
Baylor College of Medicine

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Objectives

- Describe the differences between adolescents and younger children and between adolescents and adults
- Summarize evidence for best practices in diagnosing and treating LTBI and disease in adolescents
- Identify potential strategies to apply these practices in your setting

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The Adolescent Conundrum

Trait	Pediatric	Adult
Symptoms		x
Radiographic findings	x	
Difficulty in obtaining adequate specimens	x	
Difficulty in securing microbiologic diagnosis	x	
Concern for medication tolerance		x
Consideration for alternative methods of birth control		x
Infection control considerations / public health ramifications		x

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Epidemiology of Adolescents

Variable	Total U.S. population	10-14y	15-19y
% of population	N/A	6.9%	7.1%
Foreign born	13%	5%	7%
Below poverty line	15%	19%	20%
Uninsured	16%	10%	15%

Pediatrics 2012;130:e1425; www.census.gov

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Epidemiology of TB by Age

Table 2. Characteristics of persons with TB — United States, 2024 and 2025

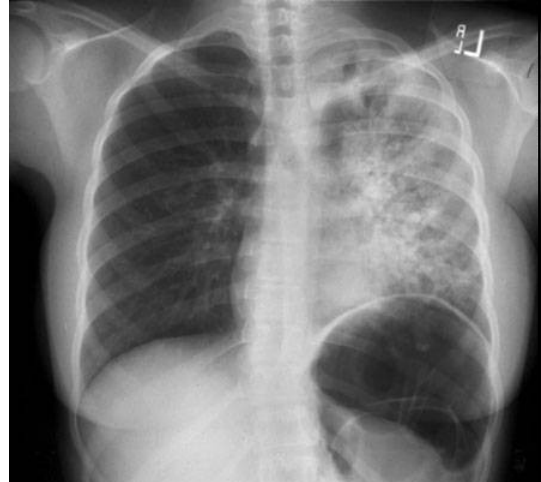
Characteristic	No. of cases (%) [*]			TB rate [†]		
	2024	2025	% change 2024 to 2025	2024	2025	% change 2024 to 2025 [§]
Age group, [¶] yrs						
0–4	267 (3)	217 (2)	-19	1.4	1.2	-19
5–14	254 (2)	196 (2)	-23	0.6	0.5	-23
15–24	1,143 (11)	1,046 (10)	-8	2.6	2.4	-10
25–44	3,504 (34)	3,429 (33)	-2	4.0	3.8	-4
45–64	2,676 (26)	2,649 (26)	-1	3.3	3.2	-1
>65	2,518 (24)	2,632 (26)	5	4.2	4.3	1



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Risk of Progression from TB Infection to Disease by Age

Age at infection (y)	No disease (%)	Pulmonary TB (%)	CNS TB (%)
<1	50	30-40	10-20
1-2	75-80	10-20	2.5
2-5	95	5	0.5
5-10	98	2	<0.5
>10	80-90	10-20	<0.5



Peds in Review 2010;31:13

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CXR Findings in Adolescent TB

More common	Less common
Cavities	Mediastinal lymphadenopathy
Pleural disease	Miliary
More extensive parenchymal disease (less likely to be detected via active case finding compared to younger children)	

Braz J Infect Dis 2011;15:40

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Microbiologic/PCR Yield, Pulmonary TB

Assay	Younger children	Teens	Adults
Smear-positivity	2-3%	10-29%	43-72%
Culture-positivity	4-7%	21-52%	66-75%
Xpert sensitivity	50-90%	66-98%	76-95%
Xpert specificity	99%	97-99%	95-99%

Pediatrics 2004;114:333; Pediatrics 2012;130:e1425; IJTL 2012;16:1234; BMC Infect Dis 2013;13:31; Lancet Infect Dis 2013;13:36; Lancet 2011;377:1495; NEJM 2026;394:1710

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Tuberculosis in Adolescents

A French Retrospective Study of 52 Cases

Test	Result	% +
CXR	Any anomaly consistent with TB	83%
	Adenopathy	70%
	Infiltrates*	54%
TST	> 15 mm	83%
AFB	Smear	28%
	Culture	52%

Culture positivity: 23% at 12 years, **71%** at 18 years

Pediatr Infect Dis J 2006;25:930

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Predictors of Smear-Positivity

- 78 adolescents, Taiwan
- Univariate analysis indicated risk factors for smear-positivity:
 - Cough > 4 weeks (aOR 13.8, 2.3-83)
 - Hemoptysis
 - Multilobar or lower lobe involvement (aOR: 12.6, 1.2-135)
 - Cavitations (aOR 7.7, 1-58)
 - Pleural effusions

IJTL 2010;14:155

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Treatment: Disease

- For larger adolescents, use ATS/CDC dosing schedule as opposed to Red Book schedule
- Routine use of B6 in adolescents
- Pregnancy test in all post-menarchal females prior to starting therapy

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Challenges

- Medical:
 - Infection control
 - Medication tolerance
 - Lack of medical home
- Social:
 - Substance use and abuse
 - Stigma
 - Missing school, work

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Infection Control

- Contact investigations: hospital, school, home, ...
 - Same principles apply in all settings
- Lack of negative-pressure rooms in many pediatric facilities
- Complacency on part of pediatric providers, or inadvertent exposure because TB not suspected

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Medication Tolerance

- Metabolize INH, EMB more slowly than younger children, but faster than adults
- Few adolescent-specific data; in our series of 145, 6 (4%) had side effects, 2/6 with transaminitis
- Discuss birth control options with all post-menarchal girls
- Baseline transaminases

Tuberculosis 2012;92:9; Arch Dis Child 2005;90:614

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Unexplained Deterioration During Antituberculous Therapy in Children and Adolescents

Clinical Presentation and Risk Factors

Nisha Thampi, MD,* Derek Stephens, MSc,† Elizabeth Rea, MD, MSc,‡§ and Ian Kitai, MD*§

- 110 HIV-uninfected children, Toronto 2002-2009
- Deteriorations occurred in 14%, associated with:
 - Weight for age $\leq$ 25th percentile
 - Multiple sites at diagnosis
 - Most common site: airway compression from enlarging intrathoracic lymphadenopathy
- Median time: 80 days (range: 10-181 days)

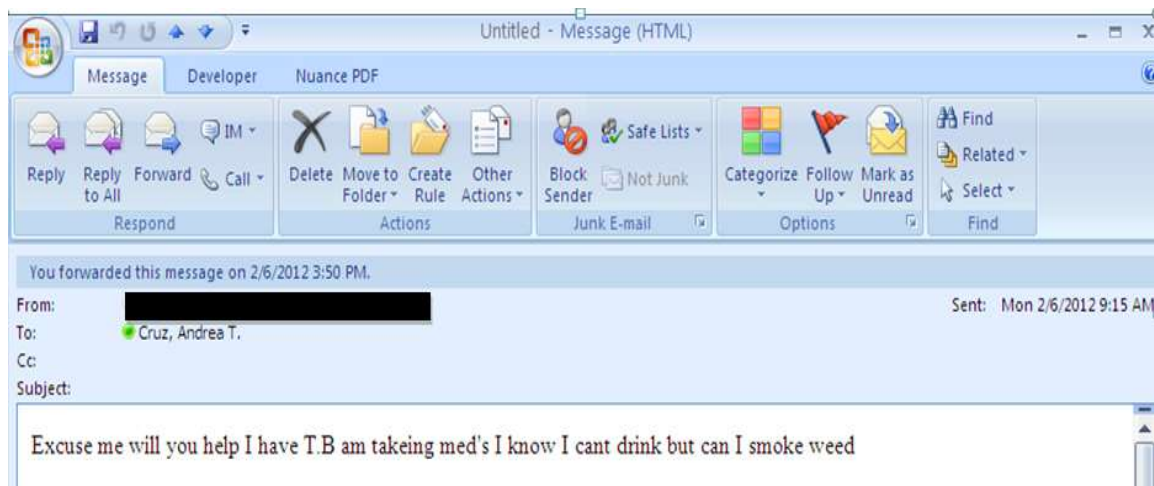
Pediatr Infect Dis J 2012;31:129

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Lack of Medical Home

- Changes preventive opportunities
- Changes venues where present to care
- TB clinician often serves as their 'real' pediatrician, at least for the next 6-9 months:
 - Opportunity for health maintenance
 - Catch-up vaccinations
 - Screen for other diseases
 - Contraception

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Feb 11, 2013, 9:32 AM

What happens if you we're
taking the pills for the T-B
and you do drugs like lean
&dro just once

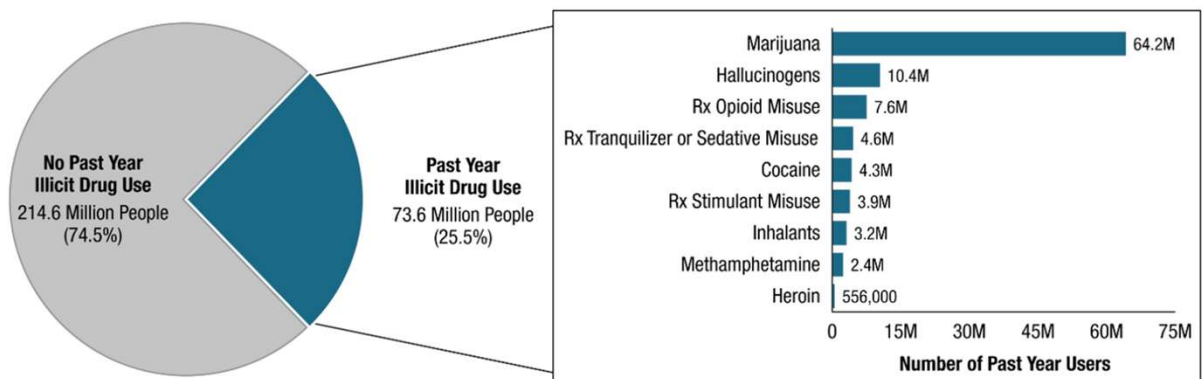
Lean: promethazine + codeine + Sprite +/-
Jolly Ranchers

Dro: hydroponically-grown marijuana

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Teens, Substance Use & Abuse: 2024

Figure 2. Number of Americans 12 Years or Older Reporting Use of Specific Illicit Drugs in the Past Year, 2024

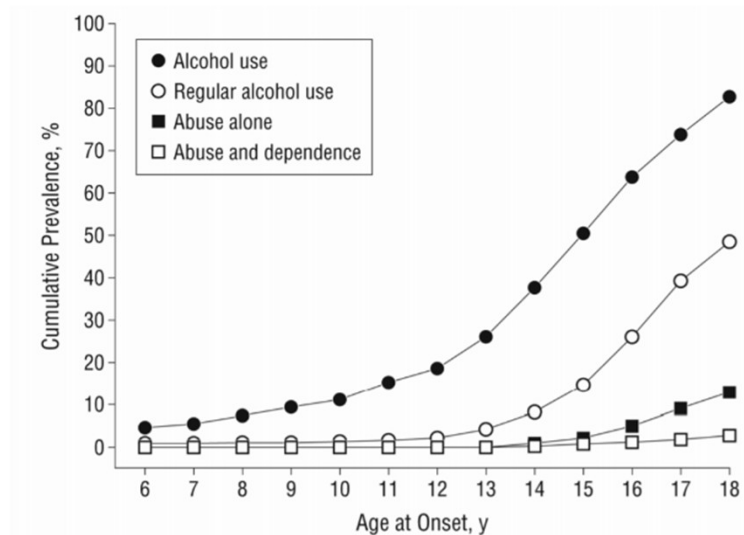


Data suggest substance use, abuse worsening during the COVID-19 pandemic

<https://www.samhsa.gov>

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Prevalence of alcohol use in children, teens



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Stigma

- Guilt over potentially infecting family members, friends, classmates
- Fear about ramifications of contact investigations
- Address social media, messaging
- Judicious sharing of information

Link between stigma, adherence, and concomitant use of other substances (& other risk-taking behavior)

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Missing School

- Coordinate with local health departments re: repeat sputum sampling in the field
- Arrange for work to be sent home versus home schooling until they can return to school
- If possible, try to fit appointments during spring break, holidays, etc to minimize time lost

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Conclusions

- Adolescents straddle the line between pediatric and adult TB in terms of presentation, diagnostics, and treatment
- There are few adolescent-specific data available to guide management, and the age group per se poses challenges to providers
- In contrast to the younger child, the adolescent needs to be an active participant in his/her care

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