

Laura Gomez, RN, BSN

Tuberculosis(TB) Program
Coordinator
Dallas County Health and
Human Services

Tuberculosis(TB) Today



Objectives

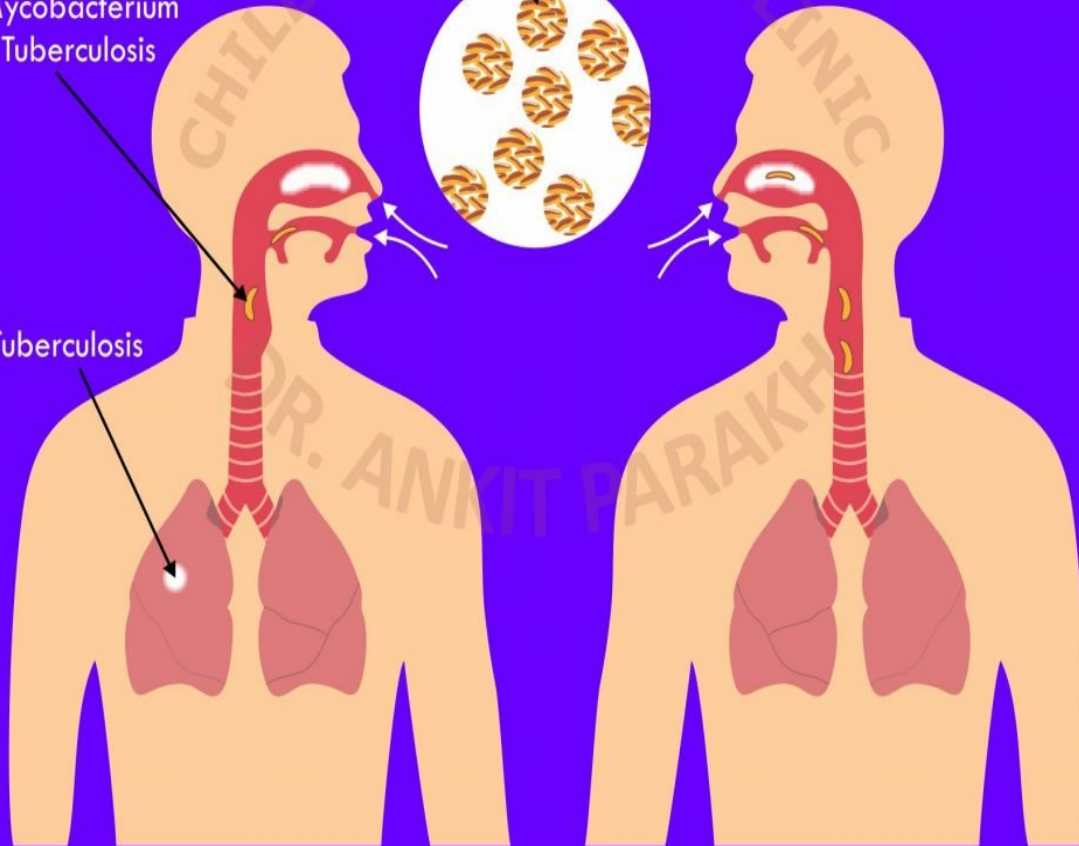
- Discuss local and statewide TB rates
- Explore new trends in the management and treatment of TB
- Name one new drug used to treat resistant tuberculosis
- Describe the impact of TB and nontuberculous mycobacterium (NTM) infections in the community

TUBERCULOSIS

Droplets from a cough or sneeze
by an infected person

*Mycobacterium
Tuberculosis*

Tuberculosis

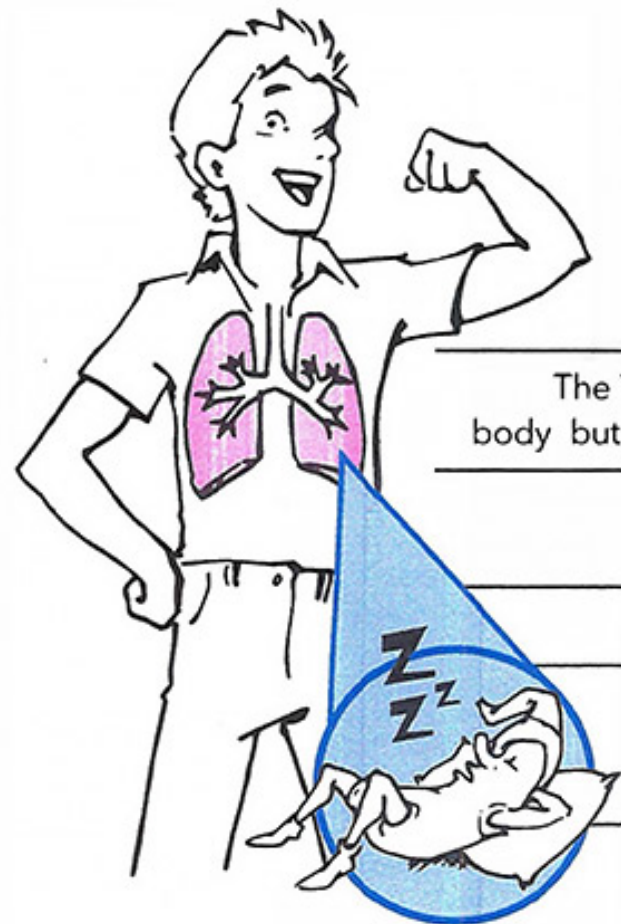


Tuberculosis is caused by *Mycobacterium tuberculosis* and most often affects the lungs.

The bacteria are spread from person to person through the air.

There are two types of tuberculosis: active disease and latent infection.

Both active disease and latent infection are reportable.



Latent TB Infection

I am healthy.

The TB germs are "sleeping" in my body but could "wake up" in the future.

I have no symptoms.

My chest x-ray is normal.

I am not contagious.

I have a positive result on a TB skin test or blood test.

Active TB Disease

I have a serious illness that could kill me if left untreated.

The TB germs have "woken up".

I may have symptoms – cough, fever, weight loss, night sweats.

My chest x-ray may be abnormal.

I may be contagious and could infect other people when TB germs are spread through the air when I cough, laugh or speak.

I may have a positive result on tests of my phlegm.



Reporting Requirements



TB disease- 1 working day

- Reportable tuberculosis disease includes: suspected TB disease pending final laboratory results; positive nucleic acid amplification tests; clinically or laboratory-confirmed TB disease; and all *Mycobacterium tuberculosis (M. tb)* complex including *M. tuberculosis*, *M. bovis*, *M. africanum*, *M. canettii*, *M. microti*, *M. caprae*, and *M. pinnipedii*.
- Do not wait for final lab confirmation

Latent Infection – 7 working days

TB infection is determined by a positive result from an FDA-approved Interferon-Gamma Release Assay (IGRA) test such as T-Spot TB or Quantiferon - TB GOLD In-Tube Test or a tuberculin skin test

and

a normal chest radiograph with no presenting symptoms of TB disease.

Please report skin test results in millimeters.

Texas Notifiable Conditions - 2022

Report all Confirmed and Suspected cases
 24/7 Number for Immediately Reportable – 1-800-705-8868

Unless noted by*, report to your local or regional health department using number above or find contact information at <http://www.dshs.texas.gov/idcu/investigation/conditions/contacts/>



A – L	When to Report	L – Y	When to Report
*Acquired immune deficiency syndrome (AIDS) ¹	Within 1 week	Legionellosis ²	Within 1 week
Amebic meningitis and encephalitis ²	Within 1 week	Leishmaniasis ²	Within 1 week
Anaplasmosis ²	Within 1 week	Listeriosis ^{2,3}	Within 1 week
Anthrax ^{2, 3, 25}	Call Immediately	Lyme disease ²	Within 1 week
Arboviral infections ^{2, 4, 5}	Within 1 week	Malaria ²	Within 1 week
*Asbestosis ⁶	Within 1 week	Measles (rubeola) ²	Call Immediately
Ascariasis ²	Within 1 week	Meningococcal infection, invasive (Neisseria meningitidis) ^{2,3}	Call Immediately
Babesiosis ^{2,5}	Within 1 week	Mumps ²	Within 1 work day
Botulism (adult and infant) ^{2, 3, 7, 25}	Call Immediately ⁷	Paragonimiasis ²	Within 1 week
Brucellosis ^{2, 3, 25}	Within 1 work day	Pertussis ²	Within 1 work day
Campylobacteriosis ²	Within 1 week	*Pesticide poisoning, acute occupational ⁸	Within 1 week
*Cancer ⁹	See rules ⁹	Plague (Yersinia pestis) ^{2, 3, 25}	Call Immediately
<i>Candida auris</i> ^{2, 3, 10}	Within 1 work day	Polio myelitis, acute paralytic ²	Call Immediately
Carbapenem-resistant Enterobacteriales (CRE) ^{2, 11}	Within 1 work day	Poliovirus infection, non-paralytic ²	Within 1 work day
Chagas disease ^{2, 5}	Within 1 week	Prion disease such as Creutzfeldt-Jakob disease (CJD) ^{2, 12}	Within 1 week
*Chancroid ¹	Within 1 week	Q fever ²	Within 1 work day
*Chickenpox (varicella) ¹³	Within 1 week	Rabies, human ²	Call Immediately
* <i>Chlamydia trachomatis</i> infection ¹	Within 1 week	Rubella (including congenital) ²	Within 1 work day
*Contaminated sharps injury ¹⁴	Within 1 month	Salmonellosis, including typhoid fever ^{2, 3}	Within 1 week
* Controlled substance overdose ¹⁵	Report Immediately	Shiga toxin-producing <i>Escherichia coli</i> ^{2, 3}	Within 1 week
Coronavirus, novel ^{2, 16}	Call Immediately	Shigellosis ²	Within 1 week
Cryptosporidiosis ²	Within 1 week	*Silicosis ¹⁷	Within 1 week
Cyclosporiasis ²	Within 1 week	Smallpox ^{2, 25}	Call Immediately
Cysticercosis ²	Within 1 week	*Spinal cord injury ¹⁸	Within 10 work days
Diphtheria ^{2, 3}	Call Immediately	Spotted fever rickettsiosis ²	Within 1 week
*Drowning/near drowning ¹⁸	Within 10 work days	Streptococcal disease (<i>S. pneumoniae</i> , ^{2, 3}) invasive	Within 1 week
Echinococcosis ²	Within 1 week	* Syphilis – primary and secondary stages ^{1, 19}	Within 1 work day
Ehrlichiosis ²	Within 1 week	*Syphilis – all other stages including congenital syphilis ^{1, 19}	Within 1 week
Fascioliasis ²	Within 1 week	<i>Toxaria solium</i> and undifferentiated <i>Toxaria</i> infection ²	Within 1 week
*Gonorrhea ¹	Within 1 week	Tetanus ²	Within 1 week
<i>Haemophilus influenzae</i> , invasive ^{2, 3}	Within 1 week	Tick-borne relapsing fever (TBRF) ²	Within 1 week
Hansen's disease (leprosy) ²⁰	Within 1 week	*Traumatic brain injury ¹⁸	Within 10 work days
Hantavirus infection ²	Within 1 week	Trichinosis ²	Within 1 week
Hemolytic uremic syndrome (HUS) ²	Within 1 week	Trichuriasis ²	Within 1 week
Hepatitis A ²	Within 1 work day	Tuberculosis (Mycobacterium tuberculosis complex) ^{2, 21}	Within 1 work day
Hepatitis B, C, and E (acute) ²	Within 1 week	Tuberculosis infection ²²	Within 1 week
Hepatitis B infection identified prenatally or at delivery (mother) ²	Within 1 week	Tularemia ^{2, 3, 25}	Call Immediately
Hepatitis B, perinatal (HBsAg+ < 24 months old) (child) ²	Within 1 work day	Typhus ²	Within 1 week
Hookworm (ancylostomiasis) ²	Within 1 week	Vancomycin-intermediate Staph aureus (VISA) ^{2, 3}	Call Immediately
*Human immunodeficiency virus (HIV), acute infection ^{1, 23}	Within 1 work day	Vancomycin-resistant Staph aureus (VISA) ^{2, 3}	Call Immediately
*Human immunodeficiency virus (HIV), non-acute infection ^{1, 23}	Within 1 week	Vibrio infection, including cholera ^{2, 3}	Within 1 work day
Influenza-associated pediatric mortality ²	Within 1 work day	Viral hemorrhagic fever (including Ebola) ^{2, 25}	Call Immediately
Influenza, novel ²	Call Immediately	Yellow fever ²	Call Immediately
* Lead, child blood, any level & adult blood, any level ²⁴	Call/Fax Immediately	Yersiniosis ²	Within 1 week

In addition to specified reportable conditions, any outbreak, exotic disease, or unusual group expression of disease that may be of public health concern should be reported by the most expeditious means available. This includes any case of a select agent²⁵

See select agent list at <https://www.selectagents.gov/selectagentsandtoxinslist.html>

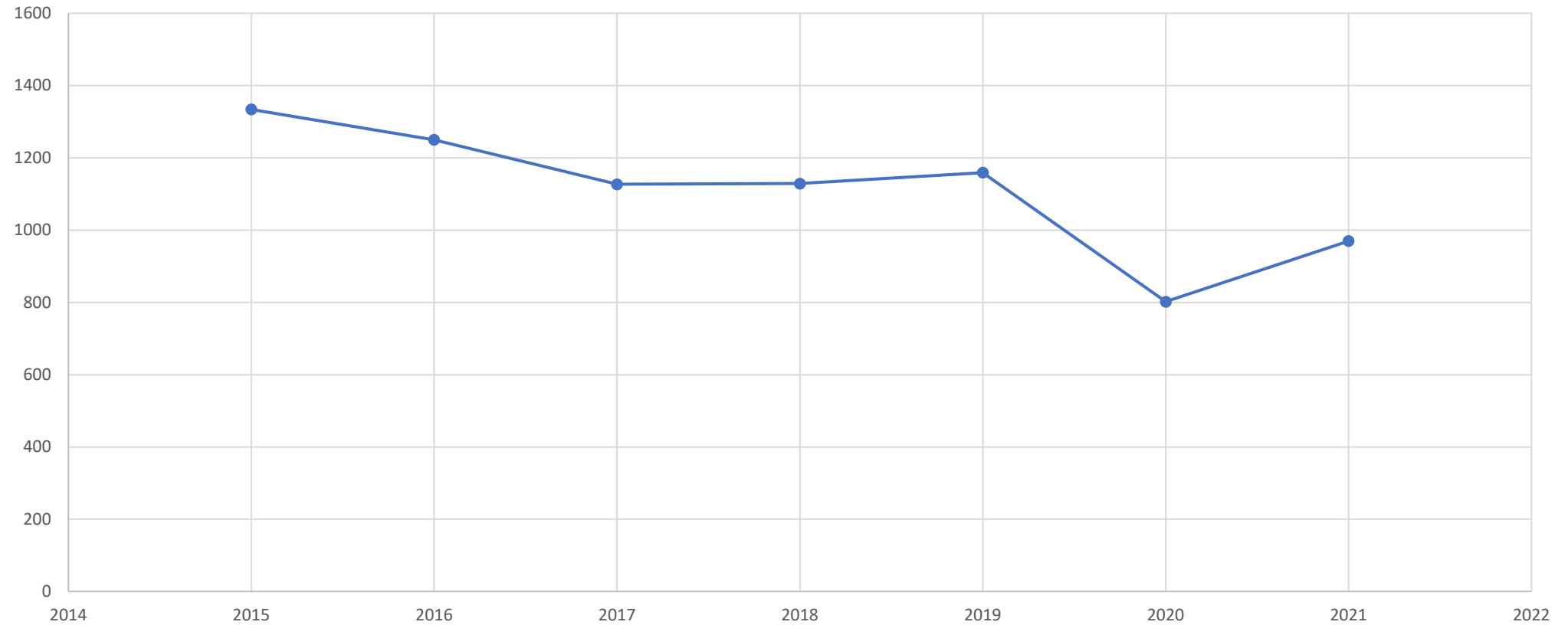
*See condition-specific footnotes for reporting contact information

TB Incidence

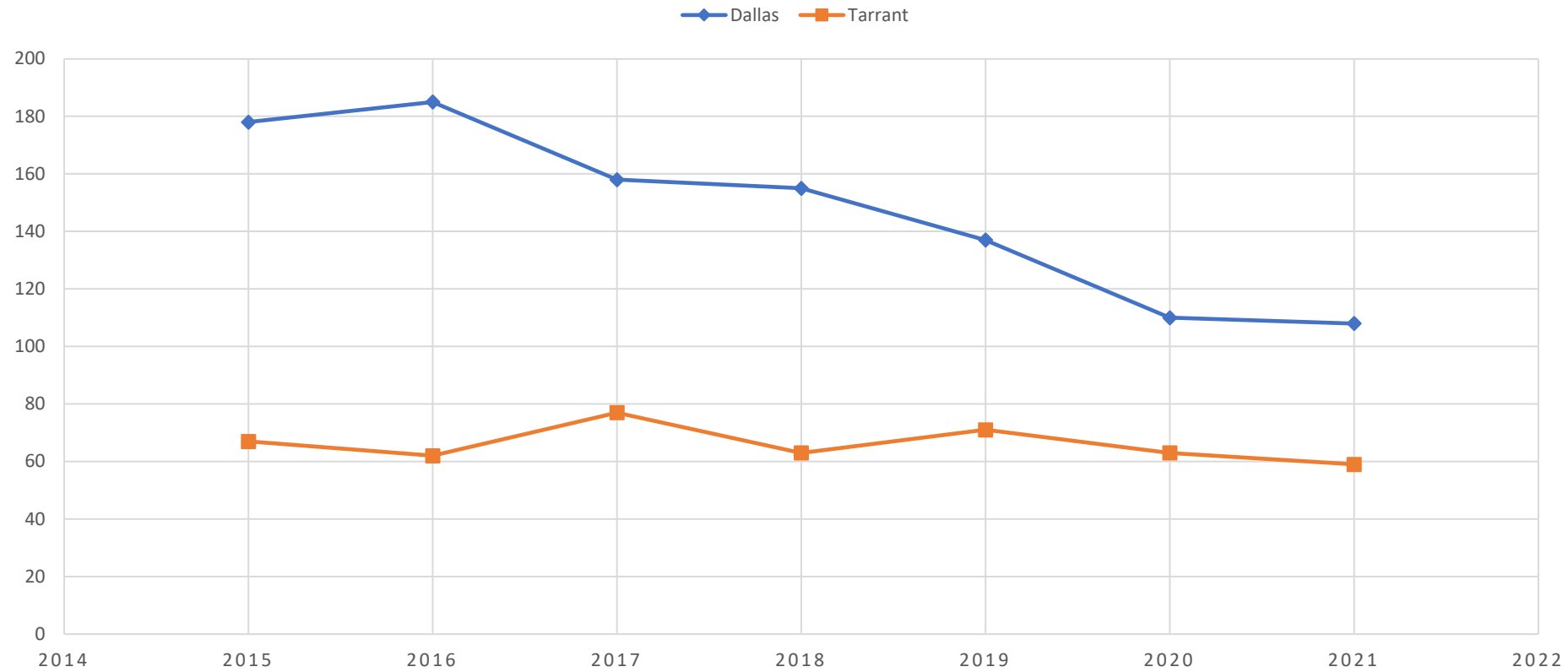
- 2020 saw a 23% decrease in the number of reported TB cases in Texas
- 2021 numbers in Texas rebounded by 13.5% to 1000
- Harris and Dallas Counties continue to report the highest number of cases in Texas
- It is estimated that up to 13 million people in the US are living with latent TB infection

• Deutsch-Feldman M, Pratt RH, Price SF, Tsang CA, Self JL. Tuberculosis — United States, 2020. MMWR Morb Mortal Wkly Rep 2021;70:409–414. DOI: <http://dx.doi.org/10.15585/mmwr.mm7012a1external icon>.

Texas 2015-2021



Dallas and Tarrant Co. 2015-2021



What's New in TB?

E-DOT

New drugs/short course regimens

Diagnostics, DNA

Testing in health care workers

Electronic Directly Observed Therapy

- Non-inferior alternative to in person visits
- Allows flexibility and privacy for clients
- Economical
- Observation can be recorded or real time
- Platforms support multiple languages

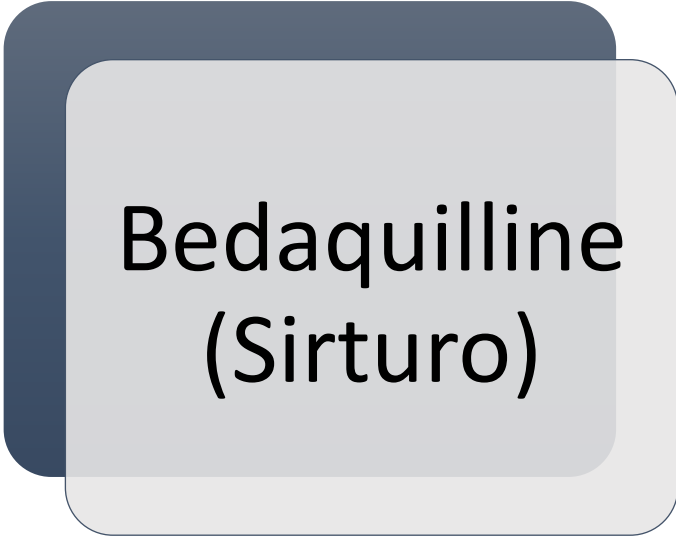
In-Person vs Electronic Directly Observed Therapy for Tuberculosis Treatment Adherence In-Person vs Electronic Directly Observed Therapy for Tuberculosis Treatment Adherence A Randomized Noninferiority Trial

JAMA Netw Open. 2022;5(1):e2144210. doi:10.1001/jamanetworkopen.2021.44210

New Drugs and Regimens

A white, torn-paper-like border runs along the bottom edge of the slide, starting from the left and extending towards the right, with a jagged, irregular edge.

New Drugs



Bedaquilline
(Sirturo)



Delamanid



Pretomanid

Shortened treatment for TB disease

In February of 2022 the CDC released new interim guidance for a 4 month treatment for drug – susceptible TB disease

Regimen – INH, Rifapentine, Pyrazinamide and Moxifloxacin

4 drugs for 8 weeks followed by continuation phase without Pyrazinamide

Awaiting DSHS guidelines for use

Shortened treatment for TB infection


3HP- 12 weekly doses of Rifapentine and Isoniazid

4 months of daily Rifampin

6 months of daily Isoniazid

3 months of daily Isoniazid and Rifampin

Diagnosics,
Deoxyribonucleic acid (DNA),
Detection

A white, torn-paper-like border runs along the bottom edge of the slide, starting from the left and extending towards the right, with a jagged, irregular edge.

Diagnostics, DNA, Detection

Nucleic acid amplification tests (NAAT, Polymerase chain reaction) - earlier treatment initiation

Molecular drug resistance tests - early identification of resistance

Available for rifampin, isoniazid and fluoroquinolone

Whole genome sequencing – analyzes chains of transmission

Defines and alerting clusters

Guides outbreak and cluster investigations

Occupational Exposure

In general, healthcare worker's (HCW) risk for TB is no longer thought to be higher than that of the general population

Study Period		HCP*			US†		
		US-born	Non-US-born	HCP Total	US-born	Non-US-born	US Total
2003–2007	Rate	1.7	17.9	4.2	2.5	22.3	4.8
	No. (%)	151 (35)	278 (65)	429 (100)	6,290 (45)	7,745 (55)	14,065 (100)
2010–2016	Rate	0.8	10.8	2.5	1.2	15.7	3.0
	No. (%)	90 (28)	262 (72)	352 (100)	3,330 (34)	6,222 (68)	9,561 (100)

*The mean annual numbers and rates for the 5- or 7-year periods were obtained from Lambert et al,¹¹ Mongkolrattanothai et al,¹² and via Lauren Lambert, personal communication.

†The comparison annual US numbers and rates for the two study periods are the data of 2005 and 2013, the mid-year of each study period when rates declined from 4.4 to 5.1 and 3.6 to 2.9, respectively.¹³

Journal of Occupational and Environmental Medicine: [July 2020 - Volume 62 - Issue 7](#)

Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019

MMWR Weekly / May 17, 2019 / 68(19);439–443

TABLE. Comparison of 2005* and 2019† recommendations for tuberculosis (TB) screening and testing of U.S. health care personnel (HCP)

- Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019
 - *MMWR*/ May 17, 2019 / 68(19);439–443

Category	2005 Recommendation	2019 Recommendation
Baseline (preplacement) screening and testing	TB screening of all HCP, including a symptom evaluation and test (IGRA or TST) for those without documented prior TB disease or LTBI.	TB screening of all HCP, including a symptom evaluation and test (IGRA or TST) for those without documented prior TB disease or LTBI (unchanged) ; individual TB risk assessment (new) .
Postexposure screening and testing	Symptom evaluation for all HCP when an exposure is recognized. For HCP with a baseline negative TB test and no prior TB disease or LTBI, perform a test (IGRA or TST) when the exposure is identified. If that test is negative, do another test 8–10 weeks after the last exposure.	Symptom evaluation for all HCP when an exposure is recognized. For HCP with a baseline negative TB test and no prior TB disease or LTBI, perform a test (IGRA or TST) when the exposure is identified. If that test is negative, do another test 8–10 weeks after the last exposure (unchanged) .
Serial screening and testing for HCP without LTBI	According to health care facility and setting risk assessment. Not recommended for HCP working in low-risk health care settings. Recommended for HCP working in medium-risk health care settings and settings with potential ongoing transmission.	Not routinely recommended (new) ; can consider for selected HCP groups (unchanged) ; recommend annual TB education for all HCP (unchanged) , including information about TB exposure risks for all HCP (new emphasis) .
Evaluation and treatment of positive test results	Referral to determine whether LTBI treatment is indicated.	Treatment is encouraged for all HCP with untreated LTBI, unless medically contraindicated (new) .

Antibiotic Resistance in Tuberculosis



Types of Resistance

<u>Drug resistant</u>	<u>Multi drug resistant(MDR)</u>	<u>Pre - Extensive</u>	<u>Extensive</u>
<i>Resistant to at least one first line anti TB drug (INH RIF EMB,PZA)</i>	<i>Resistant to at least INH and Rifampin</i>	<i>Resistant to INH, Rifampin and a fluoroquinolone Or INH, RIF and a second line injectable</i>	<i>Resistant to INH,Rifampin, a fluoroquinolone and a second line injectable Or INH, Rifampin, a fluoroquinolone and bedaquilline or linezolid</i>

**Primary resistance occurs when the person is infected with a resistant strain of the bacteria.
Acquired resistance occurs when the bacteria become resistant during the course of treatment
– usually due to improper treatment or inconsistency in taking the medication as directed**

The Numbers

- In 1993 there were ~500 cases of MDR TB in the US, compared to 56 in 2020
- From 2015-2019 Texas averaged eight MDR cases per year
- Dallas County has averaged just under two cases /year of MDR since 2017

Considerations

- Prevalence is greater outside the US
- WHO estimates 4.1% of new TB cases are Multi drug or Rifampin resistant
- More than half of the estimated global cases of MDR in 2019 were not detected or reported
- Of those reported, approximately 2/3 were not on appropriate treatment
- Prevention is key
- Accurate diagnosis and treatment of primary drug resistance
- Prevention of secondary resistance through appropriate and complete treatment

Treatment

Can be complicated and lengthy

Costly \$\$\$ - from \$20,000 for susceptible disease to \$568,000 for the most drug resistant form (XDR TB)

Side effects can be significant, sometimes permanent

Newer drugs are making shorter course treatment possible

Texas Center for Infectious Diseases

Nontuberculous Mycobacteria



NTM

Nontuberculous mycobacteria

- Nontuberculous mycobacteria are commonly found in soil and water
- Immunocompromised at higher risk
- Not contagious
- Mycobacterium avium complex or MAC causes most infections
- Mild infections may not require treatment
- Treatment can be lengthy and require multiple drugs
- Dallas County TB does not routinely treat NTM



No. 478

Nontuberculous Mycobacteria Infections Highlight Importance of Maintaining and Monitoring Dental Waterlines

In March 2022, CDC was notified of a new cluster of suspected NTM infections in children following dental procedures at a pediatric dental clinic. Investigation into this cluster is currently ongoing, and preliminary site visit data report that dental unit waterline testing results showed microbial counts much higher than the level recommended by CDC.

Dallas County TB Elimination Program

Oversight and surveillance of all TB disease in the county

Contact tracing in smear positive pulmonary cases

Targeted testing in homeless shelters, drug rehabs

Treatment

Case management

Education

Directly observed therapy



Thank You!