Drug Resistance on the Horizon: Emerging DR-TB Trends, Nursing Practice, & Binational Outcomes

Rachel Muñoz, RN

Catalina Navarro, BSN, RN

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Rachel Muñoz, RN

Has the following disclosures to make:

- No conflict of interests
- No relevant financial relationships with any commercial companies pertaining to this activity

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On the Horizon: Drug-Resistant Tuberculosis Care in Texas

World TB Day, 2026

Rachel Muñoz R.N., Nurse Consultant

Texas Department of State Health Services

TB and Hansen's Disease Section

Objectives

- Describe the epidemiology of drug-resistant TB (DR-TB) in Texas and along the Texas-Mexico border.
- Identify the components of managing DR-TB to prevent emerging resistance.
- Outline DR-TB diagnostics and care.
- Discuss the Binational TB Program and collaborations with Heartland National TB Center (HNTC) for supporting DR-TB care.

Epidemiology of DR-TB

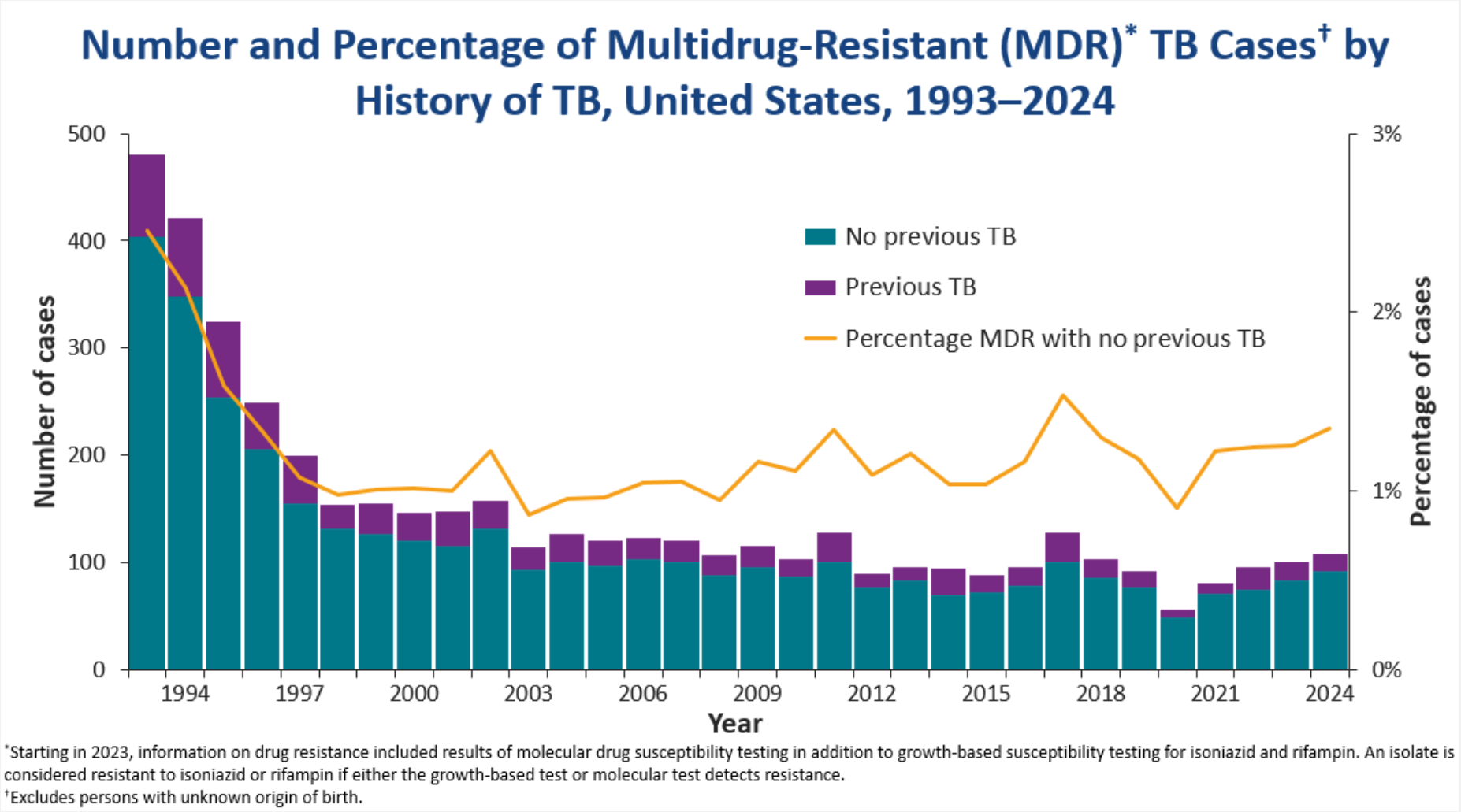
The Impact of DR-TB Worldwide

Global DR-TB Data, 2023

- 400,000 people developed rifampin-resistant (RR) or multidrug-resistant (MDR) TB globally
- 68 percent of those who started treatment were successfully treated
- Approximately 150,000 mortalities
- Over 100 countries have reported extensively drug-resistant TB (XDR-TB)

https://www.cdc.gov/global-hiv-tb/media/pdfs/2025/03/2025_DGHT_DR-TB_Factsheet.pdf

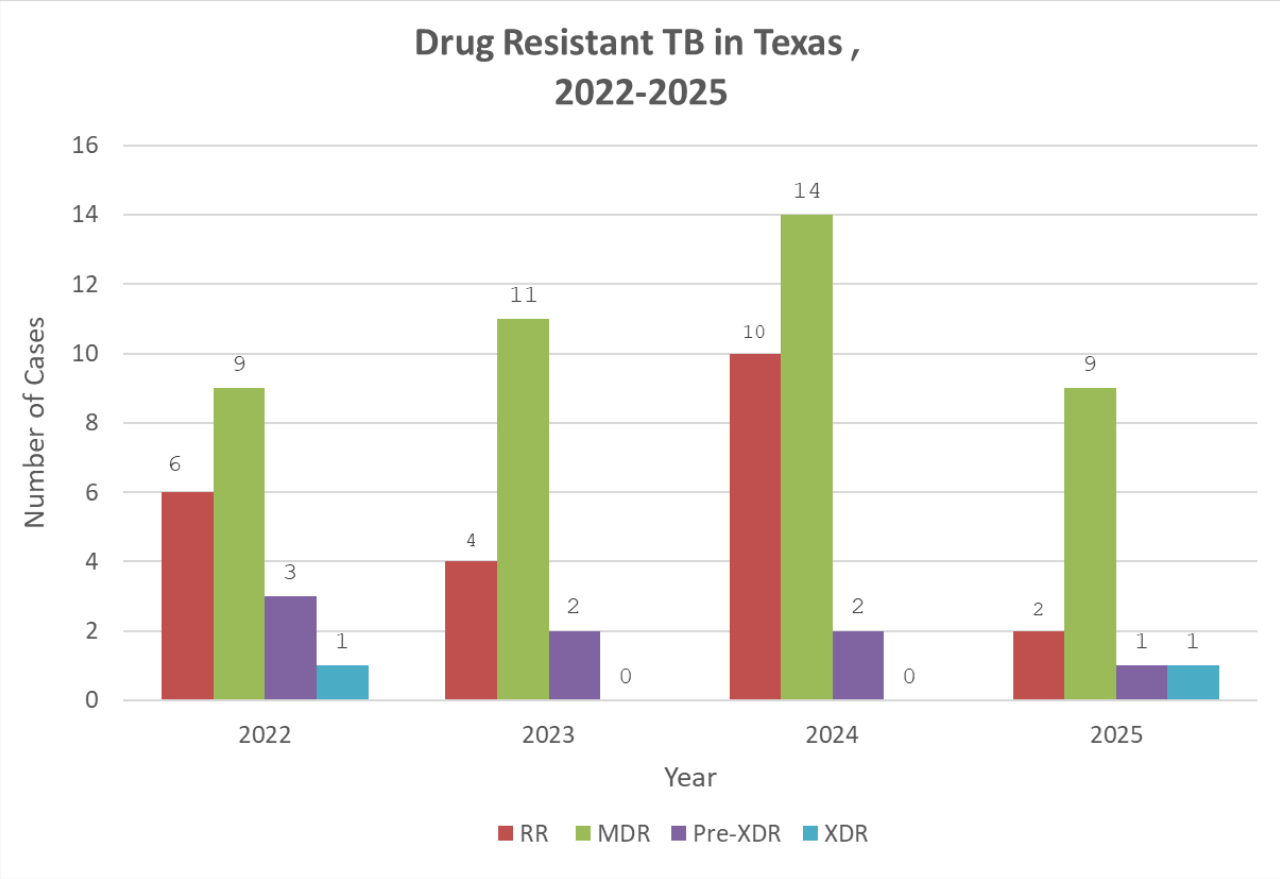
DR-TB in the United States

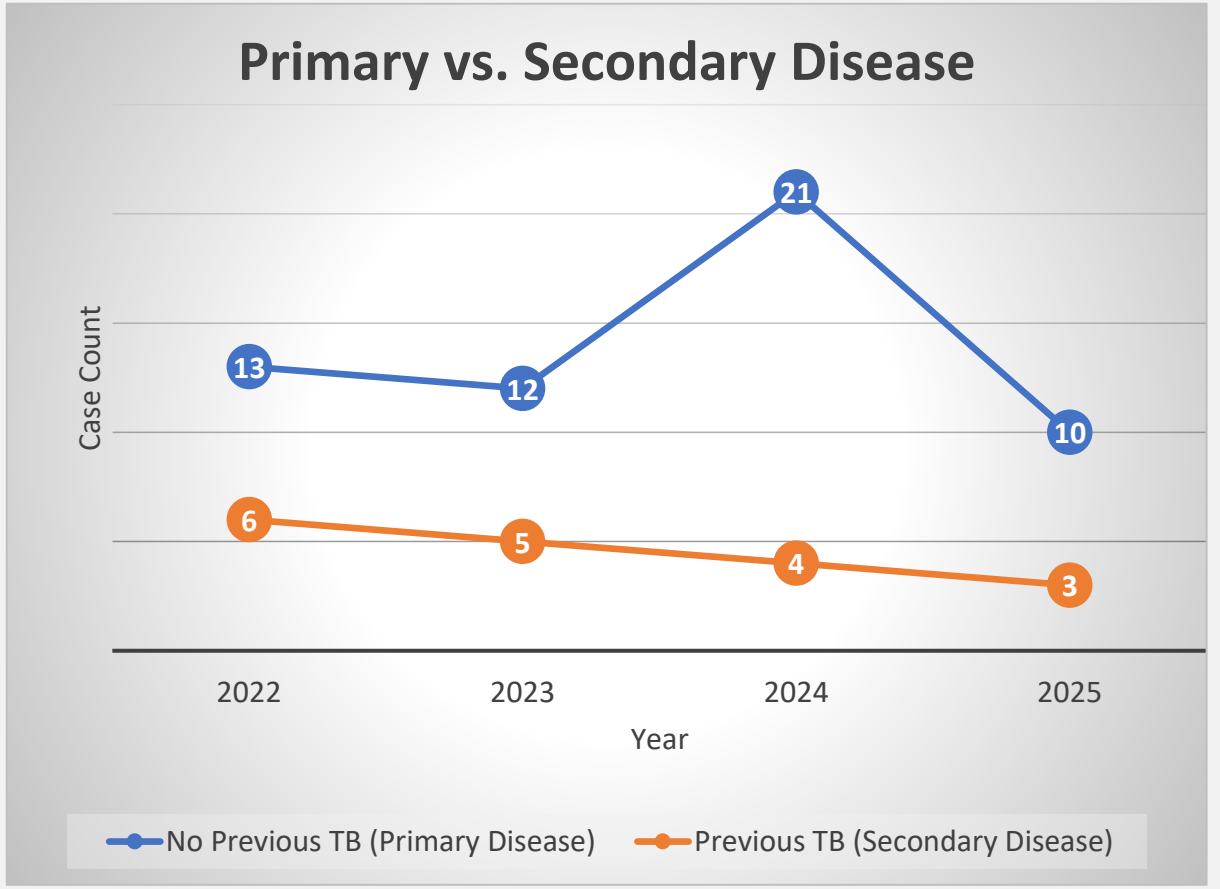


115 TB cases were reported as MDR-TB in 2024

https://www.cdc.gov/tb-surveillance-report-2024/index.html slide-set-2024-508.pptx

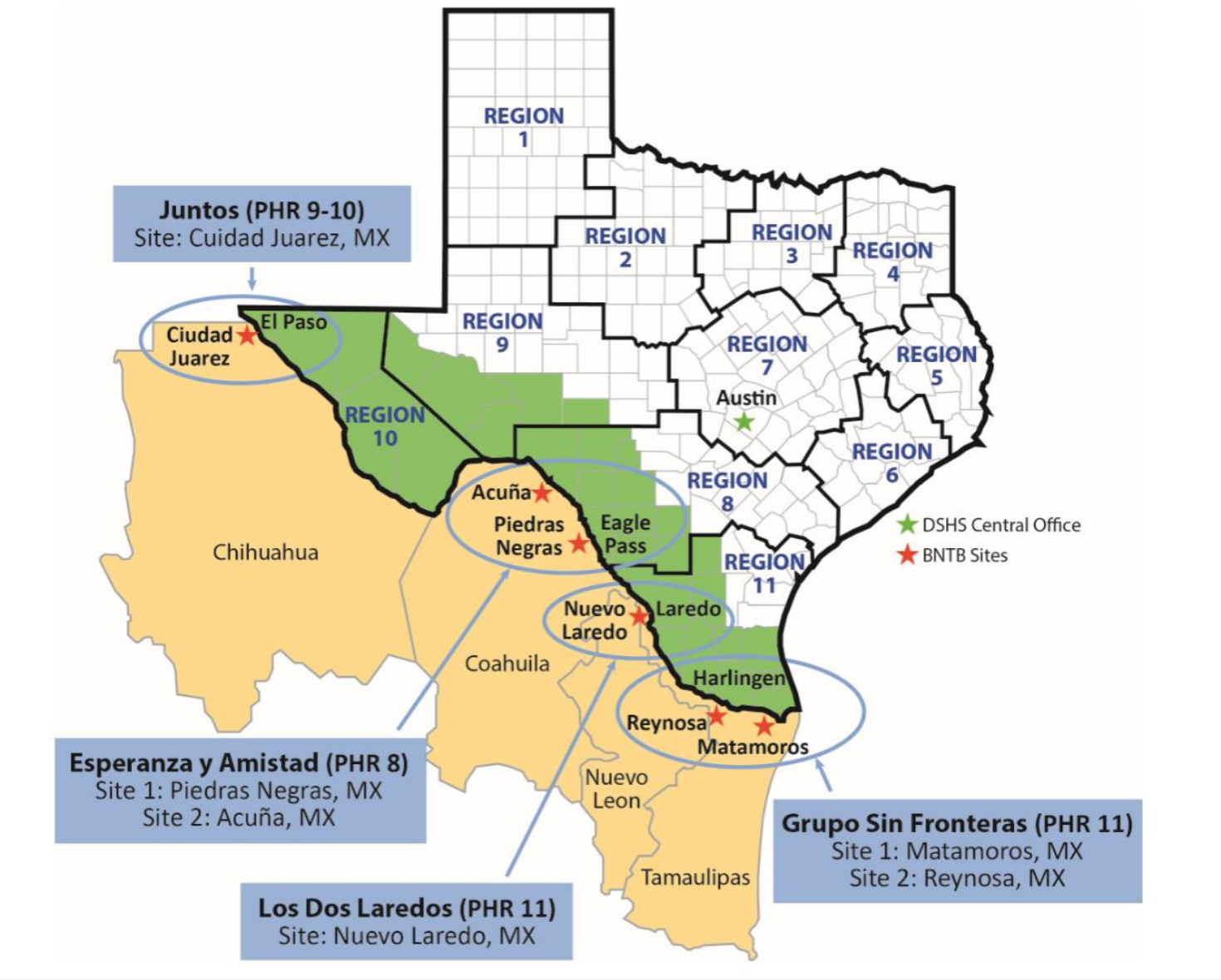
DR-TB in Texas





Source: DSHS TB and Hansen's Disease Data – 2022 – 2025; 2025 data is provisional

DR-TB Along the Texas – Mexico Border



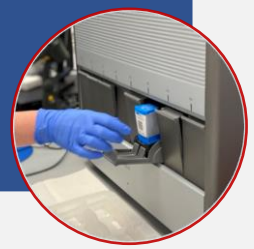
Emerging DR-TB

Challenges in Diagnostics and Care

How is DR-TB Diagnosed

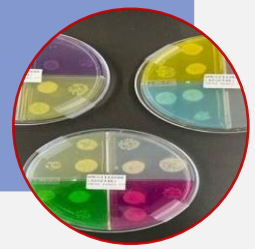
- Nucleic acid amplification (NAA) using – GeneXpert
- Can identify mutations associated with RR
- Results within 24-48 hours

Rapid Genetic Testing



- Drug Susceptibility Testing (DST) for first-line drugs and fluoroquinolones (FQN)
- Results in 11-14 days after positive culture (isoniazid and rifampin)

Susceptibility Testing



- Targeted next-generation sequencing (tNGS) for Molecular Detection of Drug Resistance (MDDR)
- Can detect mutations to drugs in the Bedaquiline, Clofazimine, Linezolid (BPaL) regimen
- Whole Genome Sequencing (WGS)

Molecular Testing

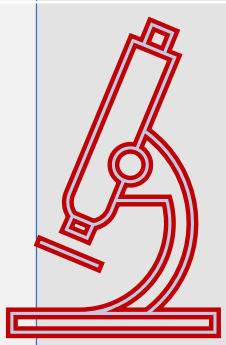
Emerging Bedaquiline Resistance

- Ten percent of MDR-TB cases in South Africa now have BDQ resistance (Hu et al., 2025).
  - Texas has reported one case with mutations to BDQ, other drugs.
- Complexities in identifying true resistance with phenotypic and molecular discordance.
- Need to learn more about mutations associated with resistance (Sonnenkalb et al., 2023).

Extensively drug-resistant TB (XDR TB): resistance to isoniazid (INH), rifampin (RIF), FQN, *and* a second-line injectable (amikacin, capreomycin, and kanamycin) ***OR*** resistance to INH, RIF, a FQN, *and* BDQ or linezolid.

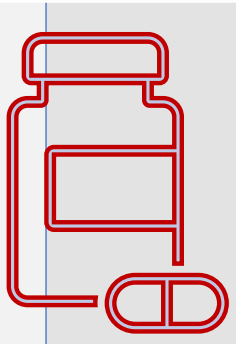
Challenges in Managing DR-TB

Understanding Diagnostics



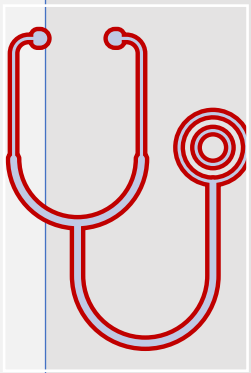
- Prompt identification of resistance
- Lack of BDQ DSTs
- Coordination of routine and specialized testing between DSHS laboratory and external laboratories
- Interpreting results often requires expertise

Building an Effective Regimen



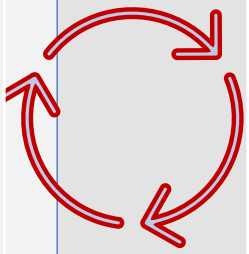
- Access to medications
  - Utilizing patient assistance programs (BDQ)
  - Drug availability for compassionate use limited in the U.S. (ethionamide, PAS)
  - Cost of drugs (tedizolid, BDQ)
- Medication adjustments often necessary

Managing Toxicity Assessments



- Staff trained in performing assessments and promptly identifying interventions (e.g., neuropathy screening in the field)
- Monitoring needs with limited resources (e.g., ECGs)
- Therapeutic drug levels, dosage adjustments

Providing Patient-Centered Care



- Managing side effects
- Adherence strategies (e.g., directly observed therapy [DOT])
- Mental health issues – depression associated with DR-TB, medications
- Stigma and fear

Heartland National TB Center

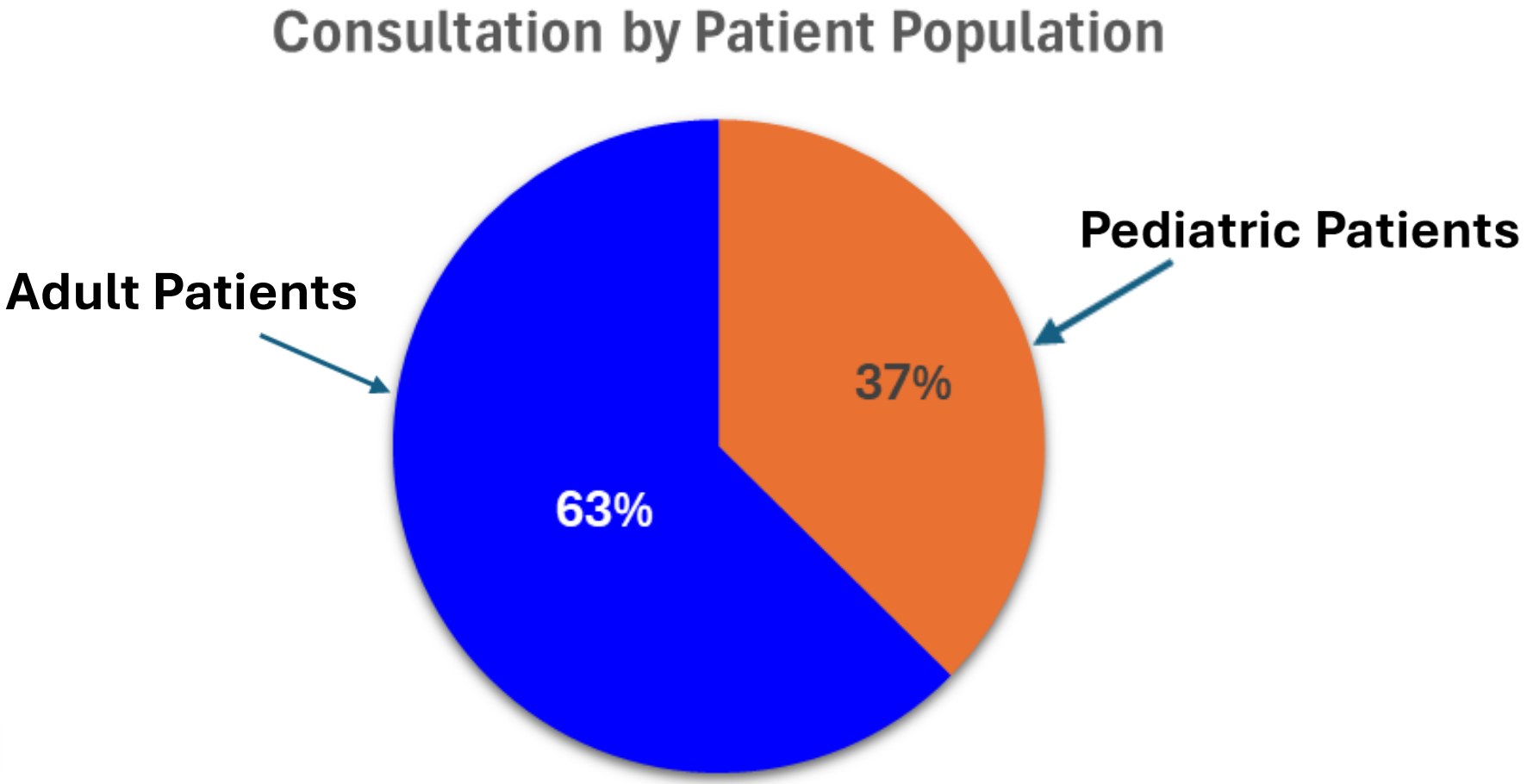
Binational TB (BNTB) Program

Strengthening DR-TB Care through Collaboration

Catalina Navarro, BSN, RN
Heartland National TB Center (HNTC) Nurse Consultant

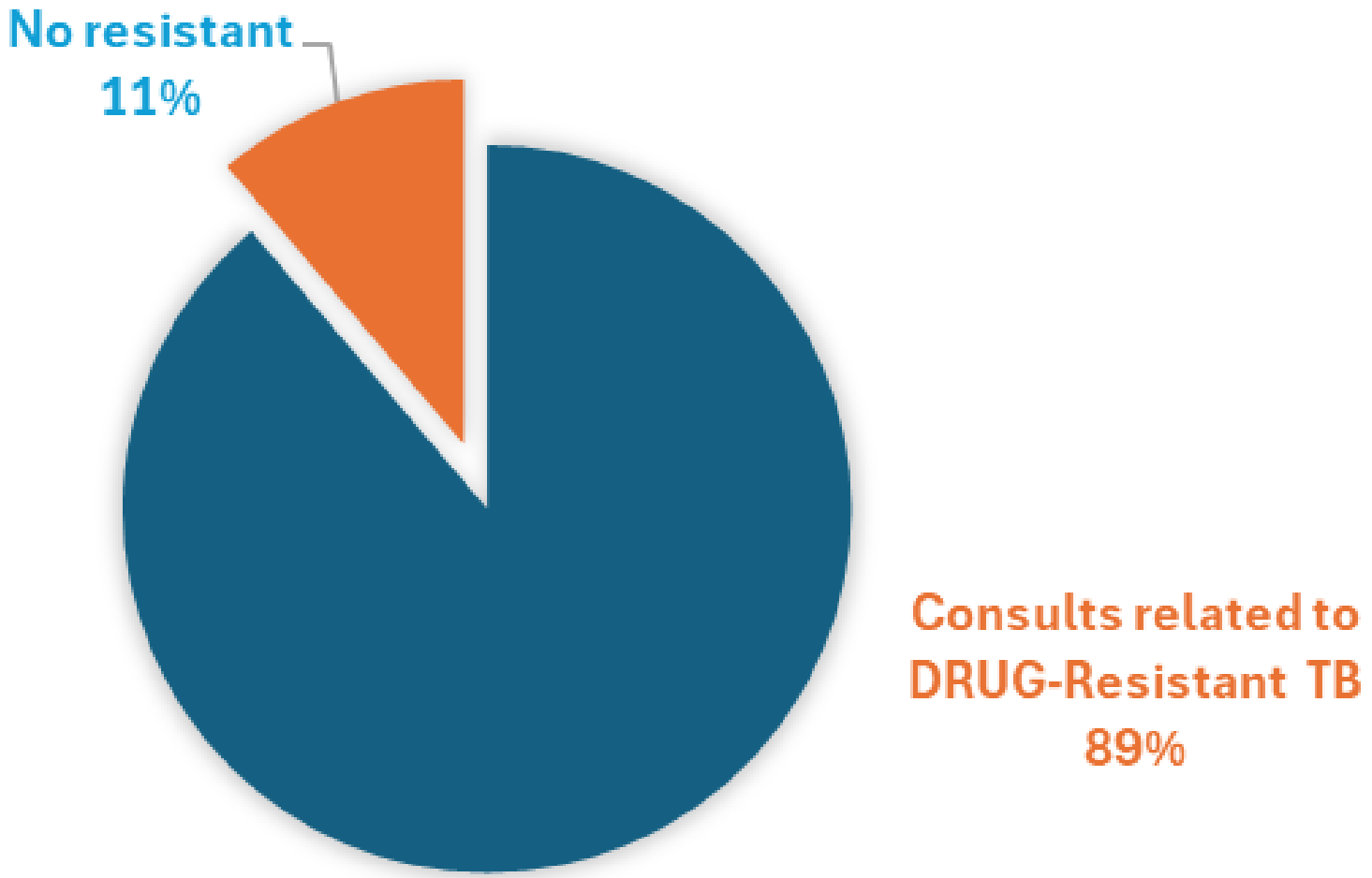
Three-Year Overview of Binational Consultations

Total Consultations: 410



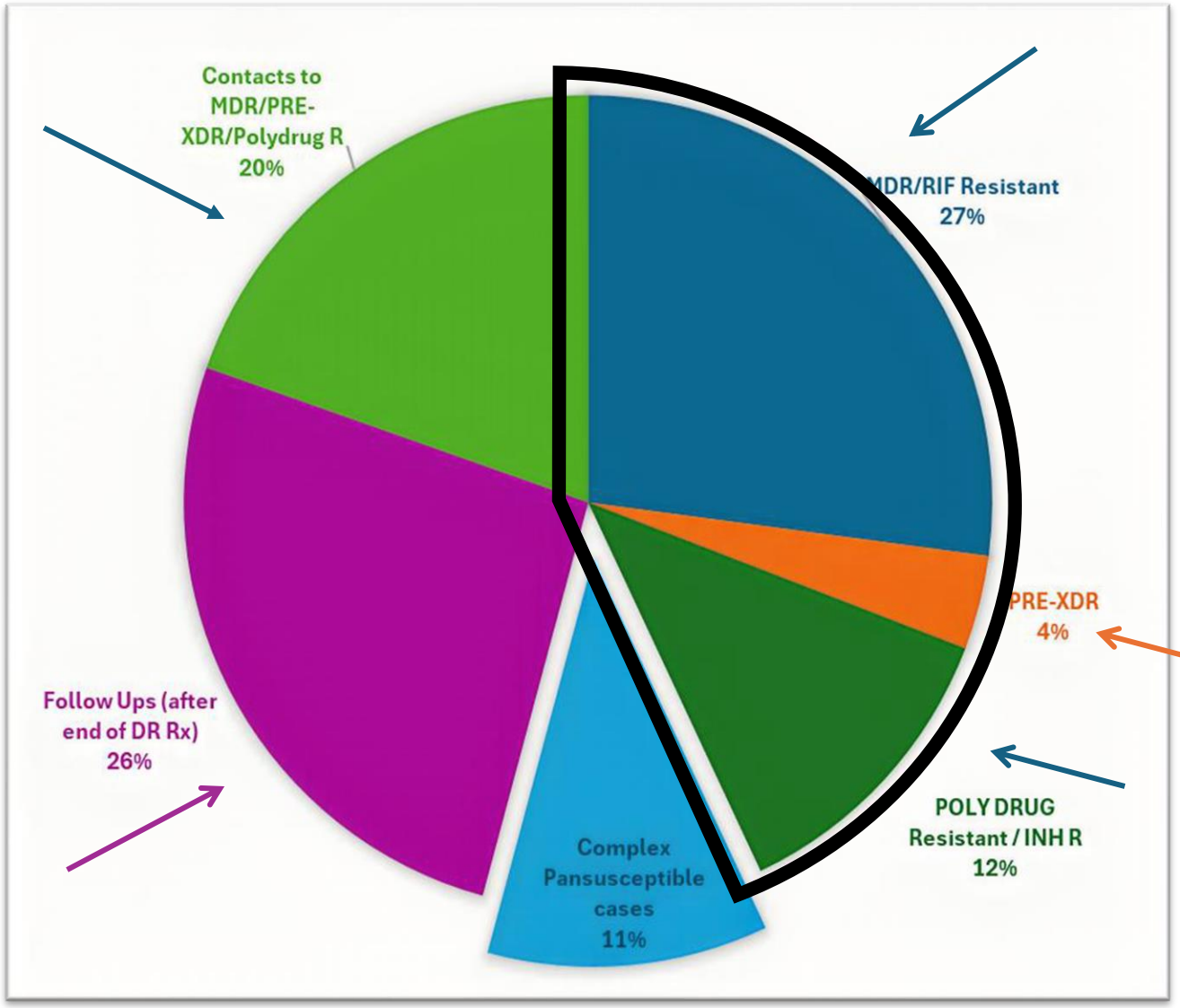
Source: Heartland National TB Center data, January 2023 – January 2026

Consults Related to Drug Resistant TB



Source: Heartland National TB Center data, January 2023 – January 2026

Spectrum of Drug-Resistant TB Consultations



Source: Heartland National TB Center data, January 2023 – January 2026

Challenges in Managing TB along the Texas-Mexico Border

- Inadequate prior treatment with non-standard regimens
- Variations in clinical practices:
  - Unsupervised regimens
  - Poor adherence or treatment abandonment with challenges to implement enforcement
- Limited diagnostic infrastructure for drug resistance in specific regions in Mexico
- Knowledge and training gaps among healthcare providers in Mexico when managing DR-TB

Impact of Collaboration for Improved Outcomes

Key Program Advances

- Adoption of shorter U.S. endorsed regimens (e.g., BPaLM)
- Significant reduction in injectable use
  - Improved patient tolerance and adherence

Clinical Outcomes

- No treatment failures
- No relapses in recent years
- Improved 24-month post-treatment follow-up monitoring

Binational Collaboration

- Strengthened coordination between Texas DSHS and BNTB programs
- High-quality patient management and continuity of care

Tuberculosis Has No Borders

- Ensure continuity of care for mobile populations along the Texas–Mexico border.
- Establish global, national, and local partnerships to ensure comprehensive and patient-centered care.
- Focus on social determinants of health, e.g., access to care, housing, and economic stability.

New Drugs and Diagnostics on the Horizon

1952 – INH first used for TB

2019 – Pretomanid approved for use in BPaL

2023 – CDC initiated tNGS for BDQ, other drugs

2025 – Texas reported the first BDQ resistant patient (additional mutations noted)

2025- Pipeline report for clinical development of novel drugs

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- Sonnenkalb, Lindsay Barilar, Ivan et al. Bedaquiline and clofazimine resistance in *Mycobacterium tuberculosis*: an in-vitro and in-silico data analysis. The Lancet Microbe, Volume 4, Issue 5, e358 - e368 https://www.thelancet.com/action/showCitFormats?doi=10.1016%2FS2666-5247%2823%2900002-2&pii=S2666-5247%2823%2900002-2

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Thank you

Drug-Resistant TB Care in Texas

Rachel.munoz@dshs.Texas.gov