



Monitoring and Managing Response to Tuberculosis Treatment

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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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Monitoring and Managing Response to Tuberculosis Treatment

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2025 Data Are Provisional and Subject to Change

(Slides resourced from Maricela Zambrano, PHR 11)



Objectives

Identify

- components of an effective nursing and medical treatment plan
- anticipated clinical, laboratory, bacteriologic and radiologic response(s) to treatment
- physical and psychosocial influences for delayed response to treatment
- interventions for delayed/unmet treatment response thresholds



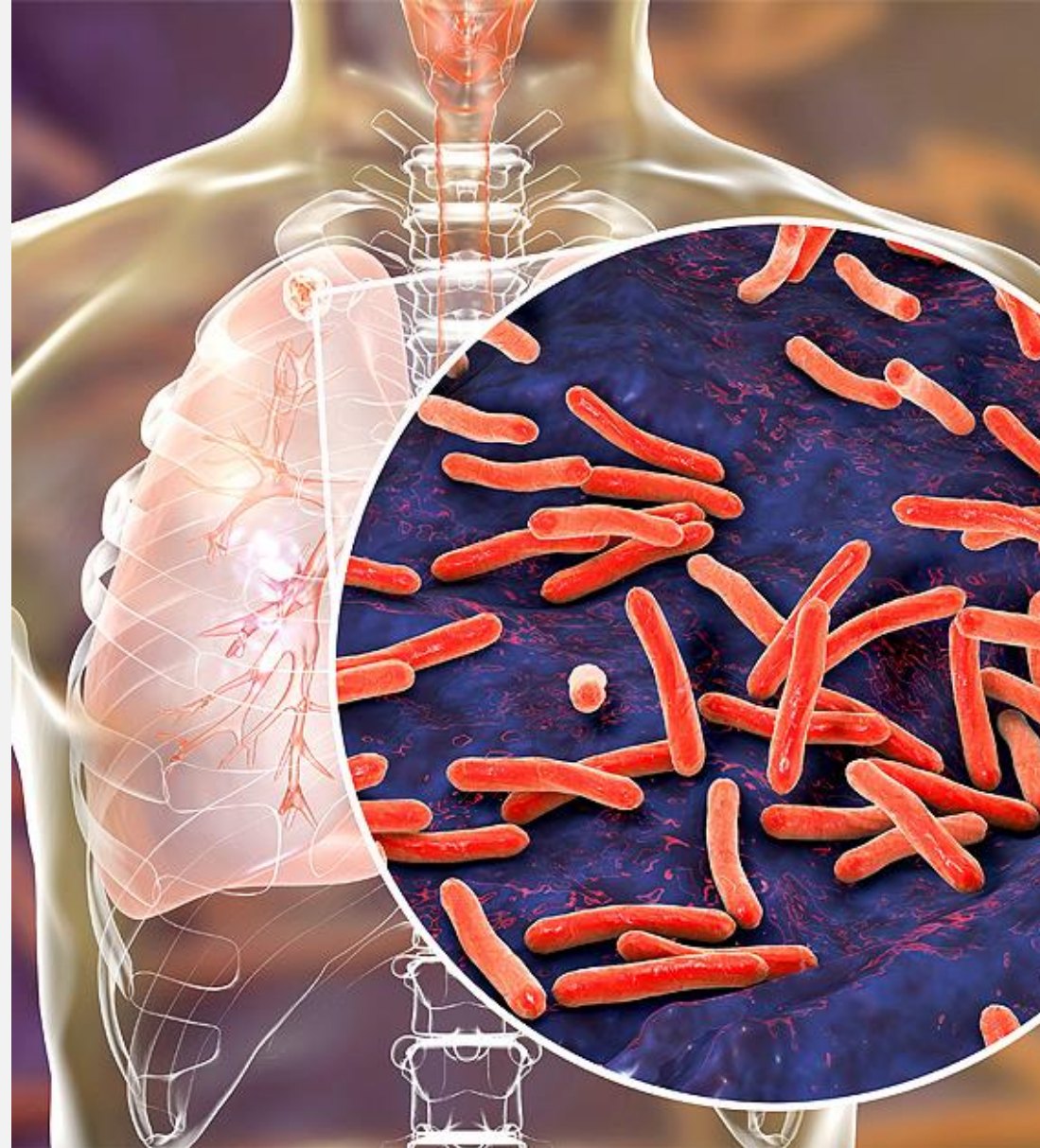
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Goals of TB treatment

- **CURE patient while minimizing risk for temporary or permanent disability and/or death**
- **provide the safest and shortest effective patient centered therapy possible**
- **develop a treatment and monitoring plan to ensure adherence and completion of treatment**
- **protect community from transmission**





Pulmonary+ Tuberculosis

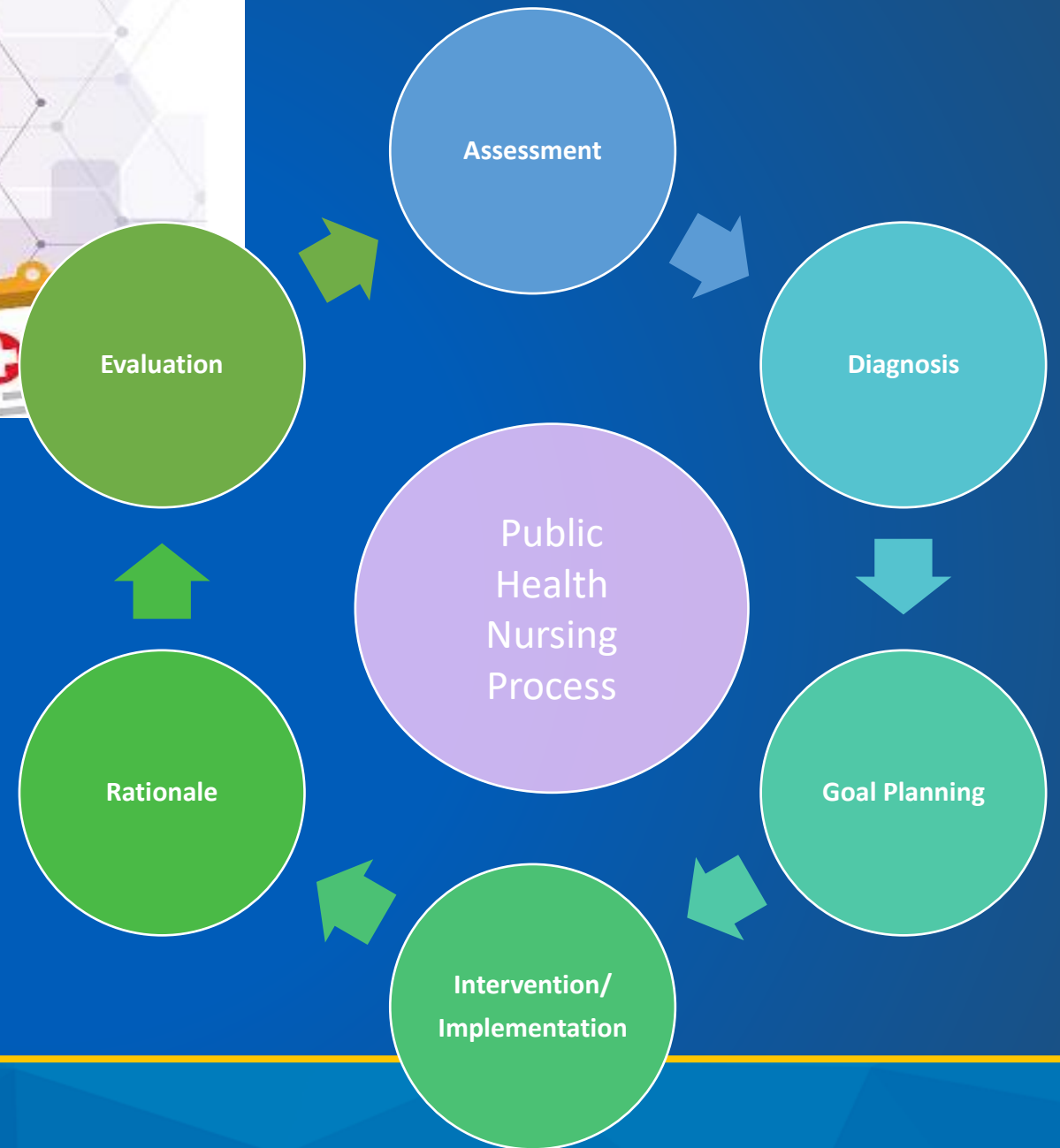
NURSING CARE PLAN

Administrative/Programmatic

Reporting
Contact investigation
Isolation Requirements
Treatment Response

Nursing Process & Diagnosis

Psychosocial	Nutrition
Oxygenation	Safety
Activity	Elimination
Self Perception	Comfort



Tuberculosis Nursing Care Plan

Assessment and Diagnosis-

- Symptom assessment, laboratory results, radiologic results, risk factors
- Sample- **impaired respiratory status due to mycobacterium tuberculosis**

Tuberculosis Nursing Care Plan

Goal planning

- Patient will be **80%** adherent to therapeutic drug regimen, experience symptomatic improvement, and AFB smear conversion within **30** days.
- Bacteriology will demonstrate AFB culture conversion within **2** months and maintain negativity at completion of treatment.
- Radiographic stability within **2** months and improved upon **completion** of treatment.
- Patient will demonstrate tolerance of treatment and be free of adverse effects.
- Patient will be assessed for psychologic and social obstacles to care at each encounter.

Tuberculosis Nursing Care Plan

Interventions

- Administer and monitor compliance of prescribed approved therapeutic treatment regimen via in-person DOT/VDOT with toxicity assessment
- Collect sputa x 3 (>8hr<24) for AFB smear every **2 weeks** until smear conversion, **monthly** until culture conversion, and **within 30 days** of completion of treatment
- Perform **monthly** and prn symptom and toxicity assessment to include CBC, CMP, additional laboratory and therapeutic drug monitoring prn
- Coordinate **baseline** 2vCXR, at completion of **2** months of treatment and within **1** month of completion of treatment

Tuberculosis Nursing Care Plan

Evaluation-Met or Unmet Goals

- DOT/VDOT adherence levels
- Symptom improvement and Smear conversion
- Culture conversion
- Toxicity assessments negative
- Psychosocial stability

Therapeutic Tuberculosis Treatment

REGIMENS



Adult

RIPE – 6, 9, or 12 months*

4HPMZ

Pediatric options-

RIPE- 6, 9, 12

SHINE - 4

* Disease site dependent

Adherence Monitoring



Direct Observation of Therapy

In Person

Synchronous

Asynchronous –(reviewed within 24 business hours)

Video directly observed therapy (vDOT) provides flexibility during TB treatment, saving time and costs



CDC recommends vDOT as an equivalent alternative to in-person DOT



bit.ly/mm7212a4
MARCH 31, 2023

MMWR

Dose Counting Methods

Calendars

Spreadsheets

Electronic Health Record

Treatment Response Monitoring

REPORT CARD

Symptom

Bacteriology

Radiology

A
B
A
B

Is treatment working?
Is patient getting better?
How do we know?
What measures?

Medical and Nursing Goals:

30 days- symptomatic improvement AFB smear conversion
8 weeks- bacteriologic AFB culture conversion and radiographic stability
6, 9, or 12- months remain AFB culture negative, radiologic improvement
All the time- tolerance of treatment, be free of adverse effects.
Psychologic and social obstacles to care assessed and addressed

REPORT CARD

F

Treatment
Failure!

Treatment Response Monitoring -

Symptoms

Symptoms of active TB disease:



Cough lasting 3+ weeks



Coughing up blood or sputum (*phlegm from deep inside the lungs*)



Chest pain



Weakness or fatigue



No appetite



Weight loss



Fever and/or chills



Night sweats

Bacteriology Date	Smear	Measure	Culture	Source
3/19/2026	Positive	<1/field	positive	Sputum
3/19/2026	Positive	<1/field	positive	Sputum
3/20/2026	Positive	<1/field	positive	Sputum
3/24/2026	Negative		positive	Sputum
3/25/2026	Negative		positive	Sputum
3/25/2026	Positive	<1/field	positive	Sputum
3/31/2026	Negative		positive	Sputum
3/31/2026	Negative		positive	Sputum
4/1/2026	Negative		positive	Sputum
5/1/2026	Negative		negative	sputum



Treatment Response Monitoring-

Bacteriology

Sputum and Bacteriology Collection Thresholds

Three consecutive sputum specimens

>8<24 hours apart, one observed and early morning
Preferably at time of or prior to drug start date

Collection at initiation of care for all patients and if initial series of three are Positive- Collect every two weeks until smear conversion
Collect monthly until culture conversion

End of Treatment Specimens

Collect **one final early morning** specimen

MDR-TB

At least one specimen in early morning **monthly** until end of treatment

Extrapulmonary TB Disease

Attempt to collect **three** consecutive specimens even if CXR is normal

Treatment Response Monitoring-

Bacteriology

Bacteriology Date	Smear	Measure	Culture	Source
2/10/2026	Positive	<1/field	positive	Sputum
2/11/2026	Positive	<1/field	positive	Sputum
2/12/2026	Positive	<1/field	positive	Sputum
2/24/2026	Negative		positive	Sputum
2/25/2026	Negative		positive	Sputum
2/25/2026	Positive	<1/field	positive	Sputum
3/4/2026	Negative		positive	Sputum
3/5/2026	Negative		positive	Sputum
3/6/2026	Negative		negative	Sputum
4/11/2026	Negative			sputum
4/12/2026	Positive			sputum
4/13/2026	Negative			sputum

In this scenario:

- RIPE therapy since 2/10/2026.
- 100% compliant with DOT/VDOT
- Symptom improvement

What goals are being met?

What now?

Treatment Response Monitoring-

Bacteriology

Bacteriology Date	Smear	Measure	Culture	Comments
1/10/2026	Positive	<1/field	positive	Pan susceptible
1/11/2026	Positive	<1/field	positive	
1/12/2026	Positive	<1/field	positive	
1/24/2026	Negative		positive	
1/25/2026	Negative		positive	
1/25/2026	Positive	<1/field	positive	
1/31/2026	Positive	1-10/field	positive	
1/31/2026	Positive	rare	positive	
2/1/2026	Positive	<1/field	positive	
2/10/2026	Positive	1-10/field	positive	hemoptysis
2/11/2026	Positive	>10/field	positive	Rifampin 900mg and TDM; CXR improved recheck susceptibilities
2/12/2026	Negative		positive	
2/26/2026	Negative		positive	INH to 450mg Rifampin to 1200mg Consult
2/27/2026	positive	<1/field	positive	
3/10/2026	positive	<1/field	positive	Moxifloxacin, Linezolid redraw TDM
3/11/2026	positive	<1/field	positive	
3/12/2026	Negative		positive	

Treatment Response Monitoring-

Radiology

Initial CXR – All patients

2 month Follow up CXR – if baseline is abnormal

Final CXR – if previous CXR was abnormal

PRN CXR – Interruption of treatment or concern of progression

2V CXR for <18 y/o or HIV positive

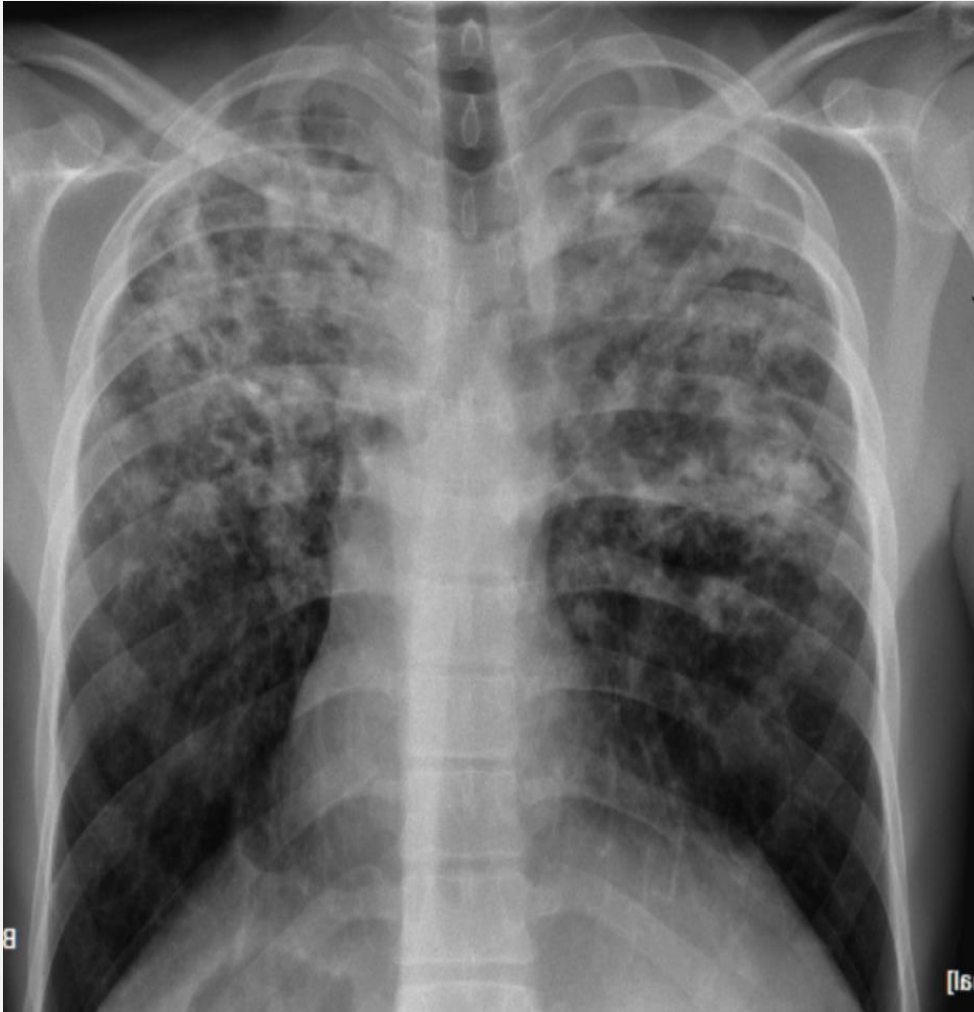
Imaging may be every month to 2 months for certain regimens or history of poor response

Pregnant patients should not delay and use abdominal shield

Other-CT and MRI on a case by case basis and determinant on site of disease (meningeal, organ)

Treatment Response Monitoring-

Radiology



Treatment Response Monitoring-

Laboratory

CBC

- WBC
- H&H
- Platelets

CMP

- Electrolytes
- BUN
- Creatinine
- Calculate Creatinine Clearance
- Liver enzymes
- Total Bilirubin

OTHER

- HgA1c
- TSH
- Magnesium
- Uric Acid
- CRP
- serum drug levels

HIV

- Viral Load
- CD4 Counts

Treatment Response Monitoring-

Physical



Is it legitimate worsening from disease burden or paradoxical ?

Identification and Monitoring of Side Effects and Adverse Reactions



**Daily DOT and Monthly
toxicity screening**

Review of Systems

Physical Exam

Laboratory Assessments

Identification and Monitoring of Side Effects and Adverse Reactions

- *Renal Dosing for Crcl<30ml/min
(EMB, PZA, Rfb)
- Hepatotoxicity
(INH, RIF, PZA)
- Peripheral Neuropathy
(INH, LZD, CS, FQs, Injectables)
- Gastrointestinal Upset
(INH, EMB, PZA, Eto/Pto, PAS, Bdq, Cfz, Dlm, LZD, Cs, Amx/Clv)
- Vision Changes
(EMB, LZD, Eto/Pto, Rfb, Rare w/Cfz & INH)



Common Side Effects/Concerns



- Rash/pruritic/cutaneous reactions – 6%
- Orange Urine
- Fatigue
- Nausea
- Abdominal pain
- Neuropathy
- Drug Interactions (Rifamycins and INH)
 - Antiretrovirals
 - Anticoagulants
 - Antihypertensives
 - Oral Contraceptives
 - Digoxin
 - Amiodarone



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Toxicity



Liver enzymes

- **>3xULN with symptoms**
- **>5xULN without symptoms**
- **T.Bili >2.0**

Rash to the point of hives

- **Diphenhydramine**
- **Cetirizine**
- **Prednisone**

Platelets

- **Thrombocytopenia**

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Nursing Plan of Care Side Effect and Adverse Reaction Monitoring

Assess patient ?diet/medications/Comorbidities

Hold medications

Collect labs as per SDO's

Document

Notify treating MD

Obtain new orders

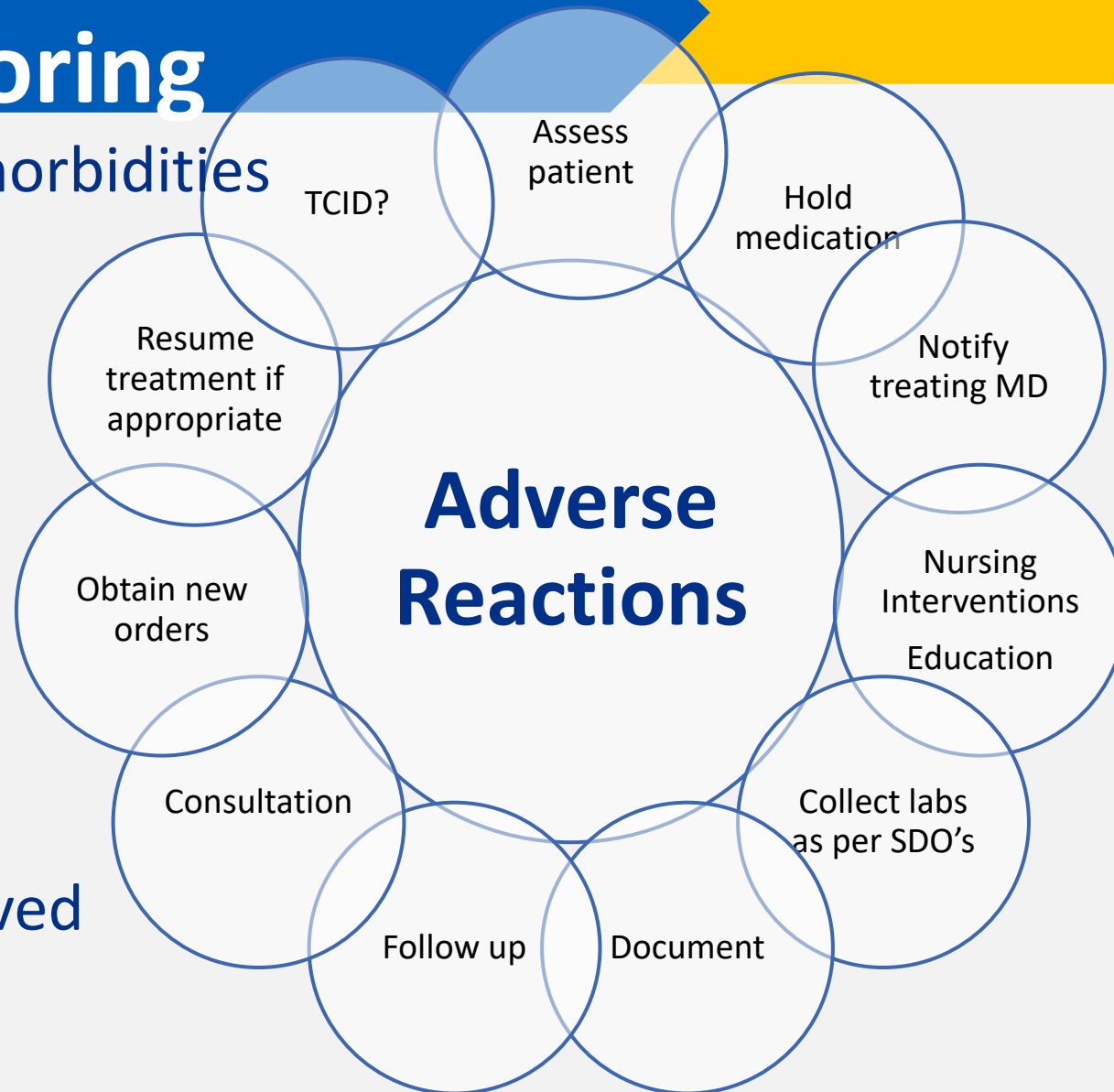
Follow up

Educate patient

Resume treatment if appropriate

Consultation with Heartland or Approved provider

Transfer TCID?



Patient and Administrative Care After Adverse Reactions

Address Patient Concerns

- Reassure patient
- Keep patient informed

Expert Consultation

- Heartland TB Consultants

Resumption of TB medications

- Drug Challenge

Document any Adverse Events

EF12-12274 Report of Serious Adverse Drug Reaction Resulting in Therapeutic Changes, Hospitalization or Death.



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Treatment Response Monitoring-

Psychosocial

Assessment

- At first visit, discuss patient goals.
- Shared decision making is difficult in the Public Health Setting. Give your patient safe controls.

Interventions

- Protect from Stigma
- Do not prolong respiratory isolation
- Build rapport with patient and address holistic needs
- Social Services
- Housing and food security needs
- Incentives and Enablers for transportation
- Support Groups

Treatment Response Monitoring-

FAILURE

Averaging up all the scores

REPORT CARD

F

Treatment
Failure!

Treatment Failure

- Culture conversion >4 months of treatment.

Potential Causes

- Cheeking medications
- Vomiting after DOT
- Drug Resistance
- High disease burden of disease
- Subtherapeutic drug levels
- Drug interactions/Comorbidities
- Patient mental status

CONSULT!!!

Treatment Response Monitoring-

Success!!

Averaging up all the scores

REPORT CARD

A+

Treatment Completion

Success in

- implementing components of an effective nursing and medical treatment plan
- Assessing and evaluating anticipated clinical, laboratory, bacteriologic and radiologic response(s) to treatment
- Identifying physical and psychosocial influences for delayed response to treatment
- Intervening appropriately for delayed/unmet treatment response thresholds

Additional Considerations

AFB (+) bacteriology results may be dead or live bugs

NAAT (+) results may occur in previously treated patients

HPLC (+) results **ARE** actively growing results

MTB (+) patients may have a negative IGRA or PPD

Patients with a normal CXR may be MTB (+)

AFB (-) and culture negative patients may be clinical cases (pleural MTB, extrapulmonary)



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Tuberculosis Nursing Resources

Heartland National TB Center

Drug Resistant TB: A Tool for TB Nurse Case Management

Nursing Guide for Managing Side Effects to Drug-resistant

TB treatment

A Survival Guide for Clinicians, 3rd edition

<https://www.currytbcenter.ucsf.edu/products>

Texas Center for Infectious Disease



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Tuberculosis Nursing Resources

DSHS Pharmacy Unit

Phone 512-776-2783

Pharmacists: Tracey Bronnenberg and Lester Mattson

Director: Sabrina Stanley

<http://www.heartlandntbc.org/products/>

https://www.currytbcenter.ucsf.edu/sites/default/files/2022-12/Rifamycin_2022.pdf

[Drug Interaction Checker: Quickly Check Your Meds \(drugs.com\)](#)

Department of State Health Services-Mycobacteriology

1100 W. 49th Street

Austin, TX 78756-3199

DSHS/South Texas Laboratory-

1301 S. Rangerville Road

Harlingen, TX 78552



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Criteria* for Collecting Serum Drug Levels

Bacteriological Criteria (consider at 8 weeks of therapy)	Medical Criteria (consider at 2-4 weeks of therapy)	Clinical Criteria (consider at 8 weeks of therapy)	Criteria based on TB Diagnosis**
<p>Slow response to adequate therapy at 8 weeks of treatment, evidenced by the following:</p> <ul style="list-style-type: none"> • Patient remains AFB sputum smear positive 2+ or greater (unless easily explained) <p>And/or</p> <ul style="list-style-type: none"> • Sputum smear results not decreasing as expected (4+ to 3+, 2+, etc.) 	<ul style="list-style-type: none"> • TB/poorly controlled diabetes comorbidity • Mal-absorption due to chronic or acute co-morbidity • Chronic or excessive vomiting or diarrhea • HIV infection and CD-4 count <100** • Low or high body mass index (>10% above or below ideal body weight) 	<ul style="list-style-type: none"> • No improvement of TB symptoms (i.e., no weight gain, no reduction in cough, etc.) at 8 weeks • Worsening CXR anytime during course of adequate therapy • New clinical deterioration, likely related to TB (i.e., new evaluation for TB relapse or concern for drug resistance**) 	<ul style="list-style-type: none"> • Patient Relapse: When signs and symptoms of TB return within two years of a prior episode of disease and there was a good possibility that relapse was due to low drug levels (exclude previous poor adherence, missed doses, or N/V) • When second line drugs need monitoring, as per consult recommendations • TB meningitis

* Therapeutic Drug Monitoring should be reserved for patients who are not responding to adequate therapy, and not necessarily for patients who meet some of the stated criteria and are otherwise doing well.

** Consultation recommended by a DSHS-recognized TB medical consultant, see list here: dshs.texas.gov/idcu/disease/tb/consultants/



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CONCLUSION

The desired outcome of successful completion and cure of Mycobacterium Tuberculosis using the shortest and safest approach is dependent upon and influenced by

- therapeutic medical and nursing therapies
- monitoring of clinical, laboratory, bacteriologic and radiographic threshold responses to treatment
- identification of physical and psychosocial barriers
- timely interventions for delayed responses

Questions and Wrap Up

Thank You!

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References:

Texas Department of State Health Services:

[TB Funded Programs | Texas DSHS](#)

[Texas Tuberculosis Manual](#)

[Texas Department of State Health Services Standing Delegation Orders for Tuberculosis Clinical Services Provided by Authorized Licensed Nurses, Fiscal Year 2025](#)

[TB Forms Resources | Texas DSHS](#)

[Rules and Regulations | Texas DSHS](#)

[TB Resources](#)

Heartland National TB Center:

Heartland National TB Center. www.heartlandntbc.org/wp-content/uploads/2025/02/Who-is-at-Risk-of-TB_Kizilbash.pdf

www.heartlandntbc.org/wp-content/uploads/2025/02/Who-Should-Be-Treated_Armitige.pdf referenced 1/20/2026

<http://www.heartlandntbc.org/training/>

Centers for Disease Control and Prevention:

[https://www.cdc.gov/tb/media/pdfs/Self Study Module 7 Patient Rights and Confidentiality in Tuberculosis Control.pdf](https://www.cdc.gov/tb/media/pdfs/Self_Study_Module_7_Patient_Rights_and_Confidentiality_in_Tuberculosis_Control.pdf)

[Slide55.PNG \(1280x720\)](#)

Additional Resources:

https://www.drugs.com/drug_interactions.html

https://www.currytbcenter.ucsf.edu/sites/default/files/2022-12/Rifamycin_2022.pdf

<https://findahealthcenter.hrsa.gov/>