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Closing the Gaps in the TB Care Cascade (CGC) Project

INSTITUTE of PUBLIC

Process Documentation for End Treatment Assessment & Pulmonary Rehabilitation (ETA-PR)

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Table of Contents

Ac	ronyn	ns & Abbreviations	4
Та	bles 8	a Figures	5
1.	Вас	kground	6
	1.1. A	About the CGC Project	6
	1.2. A	bout the End Treatment Assessment & Pulmonary Rehabilitation Intervention	6
2.	Rev	view of Literature: Evidence Synthesis	8
	2.1. E	vidence on End Treatment Assessment	8
	2.2. E	vidence on Pulmonary Rehabilitation	11
3.	The l	ETA-PR intervention process	13
	3.1. P	atient eligibility & selection process	14
	3.2. P	atient assessment	15
	3.3. P	atient referral	18
	3.4. A	ctivities in the post-assessment and follow-ups	20
	3.5. D	ata recordings across the intervention process	23
	3.6. Ir	ntervention indicators	24
	3.7. P	reliminary findings	24
4.	Tra	inings/ Capacity building	27
	4.1.	Capacity building in Jharkhand	27
	4.2.	Capacity building in Gujarat	28
5.	Learn	ings through field implementation	30
	5.1.	Mode of learnings	30
	5.2.	Challenges observed and supportive actions undertaken during the implementation	31
6.	Rec	commendations	34
7.	Anr	nexures	36

Acronyms & Abbreviations

6MWT	6-Minute Walk Test
BMI	Body Mass Index
CCQ	Clinical COPD Questionnaire
CGC	Closing the Gaps in TB Care Cascade
COPD	Chronic Obstructive Pulmonary Disease
СР	Continuation phase
DMC	Designated Microscopy Centre
DOTS	Directly Observed Therapy Short course
DSTB	Drug-Sensitive TB
ETA	End Treatment Assessment
FVC	Forced Vital Capacity
IIPHG	Indian Institute of Public Health Gandhinagar
IP	Intensive Phase
IRL	Intermediate Reference Laboratory
ISWT	Incremental Shuttle Walking Test
MUAC	Mid Upper Arm Circumference
NTEP	National Tuberculosis Elimination Program
NPCDCS	National Programme for Prevention & Control of Cancer, Chronic Respiratory Diseases,
	Diabetes, Cardiovascular Diseases & Stroke
OVD	Obstructive Ventilatory Disease
PaO2	Arterial Oxygen partial pressure
PHI	Peripheral Health institutions
PR	Pulmonary Rehabilitation
PTBLD	Post TB Lung Disease
QOL	Quality of Life
SaO2	Arterial blood oxygen saturation
SDG	Sustainable Development Goals
TAT	Turn Around Time
ТВ	Tuberculosis
ΤΝFα	Tumor Necrosis Factor alpha
TU	TB Units
WHO	World Health Organization
WHP	World Health Partners

Tables & Figures

Figure 1. Intervention Geographies of CGC project, Jharkhand & Gujarat

Figure 2. Flow chart ETA & Pulmonary Rehabilitation

Figure 3. Format of eligible patients list preparation for ETA-PR intervention

Figure 4. Chest x-ray voucher generated by care coordinators

Figure 5. Clinical evaluation form filled by medical officers (left) and updated by Care coordinators (right) under ETA-PR intervention

Figure 6. Pulmonologist's impairment assessment prescription under ETA-PR intervention

Figure 7. Overview of data collection & flow across the ETA-PR intervention

Figure 8. Snapshots of commcare app for patient assessment during the home visit in the ETA-PR intervention

Figure-9: Reasons for non-response (the gap between attempted and responded) in EAT-PR intervention

Figure 10. Capacity building and orientation for ETA-PR intervention in Jharkhand

Figure 11. Capacity building and orientation for ETA-PR intervention in Gujarat

Figure 12. State-level consultation meeting at Gujarat for ETA-PR intervention

Table 1. Summary of the TB units and peripheral health institutions under the CGC project, India

Table 2. Vital parameters observed during household visits by the Care coordinators for ETA-PR intervention

Table 3. A scoring-based questionnaire administered by Care Coordinators during the initial home visit for ETA-PR intervention

Table 4. Overview of HRs and their responsibilities engaged in the ETA-PR intervention

Table 5. Overview of HRs and their responsibilities engaged in the ETA-PR intervention

Table 6. Indicators captured under the ETA-PR intervention

Table 7. Overview of the number of patients in different stages of the ETA-PR intervention in Jharkhand, Gujarat, India during Mar-Sep 2022

Table 8. Overview of culture outcomes of the ETA-PR patients in Jharkhand, Gujarat, India during Mar-Sep 2022

1. Background

1.1. About the CGC Project

The Closing the Gaps in TB Care Cascade (CGC) project is a four-year initiative (2020-2024) funded by USAID and implemented by a consortium led by World Health Partners (WHP). This consortium includes the Indian Institute of Public Health Gandhinagar (IIPHG) and Everwell Health Solutions. The CGC project employs a monitoring framework to address diagnostic and treatment gaps at each sequential stage of the TB care cascade, visualizing the various stages in TB care delivery.

The identified gaps in the TB care cascade represent patient losses in their ability to access a TB diagnostic test, receive an accurate diagnosis, access TB treatment, adhere to daily medication, and remain TB-free post-treatment. The CGC project is actively implementing different health system interventions to close these gaps in the TB care cascade in two Indian states, Jharkhand and Gujarat (see Figure 1).



Figure 1 Intervention Geographies of CGC project, Jharkhand & Gujarat The intervention sites of the CGC project in the two Indian states, Jharkhand & and Gujarat

1.2. About the End Treatment Assessment & Pulmonary Rehabilitation Intervention

In response to the final gap, focused on remaining TB-free post-treatment, the End Treatment Assessment & Pulmonary Rehabilitation (ETA-PR) initiative was conceptualized and implemented during the 2021-22 period across 17 Treatment Units (TUs) out of the total 57 in the two states (refer to Table 1). The updated Technical and Operational Guideline on Tuberculosis from 2016 emphasizes the necessity for every patient to undergo a sputum smear microscopy and/or a culture test upon completing treatment. This is crucial because, in comparison to smear

microscopy, culture is a more sensitive and accurate method for detecting M. TB in biological specimens. Such assessments contribute to a patient-centric care approach for TB patients, ensuring confirmed treatment outcomes. It is noteworthy that the current implementation of the National Tuberculosis Elimination Program (NTEP) end treatment evaluation protocol within the healthcare system is not effective.

Pulmonary TB (PTB) patients are particularly susceptible to pulmonary impairment due to lung fibrosis associated with tuberculosis, resulting in breathlessness and limitations in daily activities. Despite this, there are no established protocols for pulmonary rehabilitation. Drawing upon available evidence of pulmonary impairment among TB patients, the CGC project has formulated an intervention package focused on the pulmonary assessment of TB patients. This aims to identify high-risk patients and facilitate referrals for pulmonary rehabilitation.

During a post-treatment follow-up dissemination workshop, recommendations were made to assess patients for tuberculosis after treatment. This approach helps identify non-responders and enhances outcome evaluation by incorporating culture follow-up. The end treatment evaluation process enables us to ascertain the status of sputum smear and culture conversion through coordination with NTEP staff, promoting a patient-centric care model.

Table 1. Summary of the TB units and peripheral health institutions under the CGC project, India						
State	District	Population	Total TU	Intervention TU		
Jharkhand	East Singhbhum	0.6 million	10	02		
	Ranchi	1.5 million	15	02		
Gujarat	Gandhinagar	0.3 million	5	01		
	Surat	4.4 million	27	12		
Total 57 17						
TU: TB Units, PHI: Peripheral Health Institutions						

Goal

- To showcase clinical, bacteriological, and radiological assessments at the end of the 6-month treatment.
- To evaluate patients for potential pulmonary rehabilitation needs.

Objectives

- Documenting the status of sputum smear and culture conversion among tuberculosis patients upon completion of treatment.
- Ensuring sputum and culture conversion through coordination with NTEP staff, emphasizing patient-centric care.

- Evaluation of pulmonary and extrapulmonary drug-sensitive TB patients by a medical officer of PHI.
- Identifying patients at high risk of pulmonary impairment and referring them for rehabilitative services to enhance functional independence.

2. Review of Literature: Evidence Synthesis

2.1. Evidence on End Treatment Assessment

Currently, the National TB Elimination program focuses on microbiological evaluation to ensure that the treated patient is microbiologically free from Mycobacterium tuberculosis. However, it is crucial to recognize the importance of radiological, functional evaluation, and subjective clinical assessment in addition to microbiological assessment. In resource-limited TB endemic settings, cure is often declared solely through sputum smear examination for acid-fast bacilli without performing culture. Sputum conversion among new smear-positive TB patients is linked to improvements in clinical symptoms and radiological findings, such as fibro-cavitary lesions.

As per technical and operational guidelines 2016, there is a follow-up assessment at the end of anti-TB treatment based on the daily treatment regimen. Currently, there is a practice of follow-up at the end of both the intensive phase and the continuous phase. To ensure alignment, patients should be closely monitored throughout their treatment with a two-component clinical follow-up and laboratory investigation. Clinical follow-up during treatment is advised every month by a medical officer through either a home visit or a patient visit to the health facility.

In the case of drug-sensitive TB, if there is no interruption in the dosage schedule, laboratory investigations are conducted at the end of the intensive phase (IP) in the 8th week and the end of the continuation phase (CP) in the 16th week. It is crucial to conduct laboratory investigations at the end of both IP and CP. For drug-sensitive TB, the ideal time is the last week or 16th week of the continuous phase (CP) if there is no interruption in the dosage schedule. This approach helps identify remaining impairments through clinical, and radiological signs, and symptom screening. Early detection and prompt action benefit both the demand and provider sides effectively. Delays in end treatment may pose operational challenges for addressing post-TB cases.

The intermittent treatment regimen was revised to the daily regimen to ensure the sputum conversion and reduction in relapse rate as per revised national NTEP guidelines. India TB Report 2022, (All TB patients of 2020) Cured Rate was Public PHI 93% and Private 27% from

bacteriologically confirmed TB patients. A study on "Sputum Smear and Culture Conversion in Multidrug Resistance Tuberculosis Patients in Seven Districts of Central Gujarat, India: A Longitudinal Study" reveals that the sputum smear and the culture conversion rate was 43.4%, 47.7%, and 57% at 6 months, 12 months, and 24 months of follow-up, respectively. The mean time for sputum smear and culture conversion was 120.27 days and 125.02 days, respectively. Most patients who were culture positive at 6 months remained so even after 12 months. There was not much difference in the time taken for culture and sputum conversion ^[1]. In 2015, India identified obstructive, restrictive, and mixed lung impairment disorders in TB patients after completing their treatment ^[2]. On the other hand, the average life expectancy is reduced by 4 years for those who are successfully cured according to multiple pieces of evidence ^[3,4,5,6]. Spirometry, plethysmography, DLCO (diffusion for carbon oxide), arterial blood gas assessment, and the 6-minute walk test (6MWT) have all been recommended as ways to assess lung function ^[7]. In several countries, obstructive abnormalities and impaired quality of life were found even in cured TB patients ^[8]. 69 PTB patients were observed for 52 weeks after diagnosis in a prospective cohort study from Mozambique. They administered valid spirometry tests for 62 patients at 8, 26, and 52 weeks of diagnosis. The proportion of lung impairment was 78, 68.9, and 64.5% respectively. Moderate and severe lung impairment is ³/₄ portion of the total sample (n=62). Female gender, low hemoglobin, and heavy smoking were found associated factors of lung impairment ^[9].

¹ Patel SV, Nimavat KB, Patel AB, Mehta KG, Shringarpure K, Shukla LK. Sputum Smear and Culture Conversion in Multidrug Resistance Tuberculosis Patients in Seven Districts of Central Gujarat, India: A Longitudinal Study. Indian J Community Med. 2018 Apr-Jun;43(2):117-119. doi: 10.4103/ijcm.IJCM_152_17. PMID: 29899612; PMCID: PMC5974826.

² Aggarwal D, Gupta A, Janmeja AK, Bhardwaj M. Evaluation of tuberculosis-associated chronic obstructive pulmonary disease at a tertiary care hospital: A case-control study. Lung India. 2017 Sep-Oct;34(5):415-419. doi: 10.4103/lungindia_longindia_522_16. PMID: 28869224; PMCID: PMC5592751.

³ Hassan IS, Al-Jahdali HH. Obstructive airways disease in patients with significant post- tuberculous lung scarring. Saudi Med J. 2005 Jul;26(7):1155-7. PMID: 16047080.

⁴ Patil S, Patil R, Jadhav A. Pulmonary functions' assessment in post-tuberculosis cases by spirometry: Obstructive pattern is predominant and needs cautious evaluation in all treated cases irrespective of symptoms. Int J Mycobacteriol. 2018 Apr-Jun;7(2):128-133. doi: 10.4103/ijmy.ijmy_56_18. PMID: 29900887.

⁵ Plit ML, Anderson R, Van Rensburg CE, Page-Shipp L, Blott JA, Fresen JL, Feldman C. Influence of antimicrobial chemotherapy on spirometric parameters and pro-inflammatory indices in severe pulmonary tuberculosis. Eur Respir J. 1998 Aug;12(2):351-6. doi: 10.1183/09031936.98.12020351. PMID: 9727784.

⁶ Chung KP, Chen JY, Lee CH, Wu HD, Wang JY, Lee LN, Yu CJ, Yang PC; TAMI Group. Trends and predictors of changes in pulmonary function after treatment for pulmonary tuberculosis. Clinics (Sao Paulo). 2011;66(4):549-56. doi: 10.1590/s1807-59322011000400005. PMID: 21655745; PMCID: PMC3095809.

⁷ Migliori GB, Nardell E, Yedilbayev A, D'Ambrosio L, Centis R, Tadolini M, van den Boom M, Ehsani S, Sotgiu G, Dara M. Reducing tuberculosis transmission: a consensus document from the World Health Organization Regional Office for Europe. Eur Respir J. 2019 Jun 5;53(6):1900391. doi: 10.1183/13993003.00391-2019. PMID: 31023852.

⁸ Akkerman OW, Ter Beek L, Centis R, Maeurer M, Visca D, Muñoz-Torrico M, Tiberi S, Migliori GB. Rehabilitation, optimized nutritional care, and boosting host internal milieu to improve long-term treatment outcomes in tuberculosis patients. Int J Infect Dis. 2020 Mar;92S:S10-S14. doi: 10.1016/j.ijid.2020.01.029. Epub 2020 Jan 23. PMID: 31982628.

⁹ Khosa C, Bhatt N, Massango I, Azam K, Saathoff E, Bakuli A, Riess F, Ivanova O, Hoelscher M, Rachow A. Development of chronic lung impairment in Mozambican TB patients and associated risks. BMC Pulm Med. 2020 May 7;20(1):127. doi: 10.1186/s12890-020-1167-1. PMID: 32381002; PMCID: PMC7203866.

A study on Tuberculosis recurrence in smear-positive patients cured under DOTS in southern Ethiopia: a retrospective cohort study" showed that, of the 397 smear-positive TB patients registered, 368 (92.7%) cured smear-positive TB patients followed for a mean duration of 3.87 years, 15 had a recurrence. The rate of recurrence was 1 per 100 PYO (0.01 per annum). A high recurrence rate occurred among smear-positive patients cured under DOTS ^[10]. Another study from China documented a pilot ETA project and evaluated the feasibility of standard operating conditions with available human resources. Lin et al found that an average of 20 minutes was taken to perform post-treatment evaluation in the clinical setting. Except for Turnaround Time (TAT) laboratory and radiology diagnostics. This study collected data on demographics, history of alcohol consumption, smoking, drug use, blood pressure, glucose fasting, chest X-ray, and a 6-minute walk-in test. The time ranged from 8 to 45 minutes for this test ^[11]. It will not be so easy to conduct in their place of residence or the community.

A recent study published by Nishi et al. found that there were no significant differences in lung function tests and 6-minute walking tests over 12-month and 24-month follow-ups. It simply tells that there is no self-healing of lung impairment. 41.82% had an obstructive ventilatory disease (OVD) and 14.5% had moderate to severe respiratory failure. The end of treatment for PTB may be the beginning of another disease with ongoing lung function. The importance of performing Pulmonary Function Tests (PFTs) should be emphasized, especially in patients with radiological sequelae. Symptoms of post-pulmonary TB are either irreversible or can be reversed, requiring further evidence ^[12]. The latest WHO Global Action Plan on Non-communicable Diseases has recognized the strong interaction between TB and chronic respiratory diseases, particularly in low-income and middle-income countries ^[13]. On the other hand, the WHO End TB strategy and the Sustainable Development Goals (SDG 3.3) still focus on reducing TB incidence and TB mortality and do not mention Post TB Lung Disease (PTBLD). Current WHO-recommended TB registries only capture mortality and morbidity during TB treatment, and as a result, patients are not followed up beyond the cure of the disease. Programmatic interventions to monitor ex-TB patients and address PTBLD are also lacking ^[14].

¹⁰ Kastien-Hilka T, Rosenkranz B, Sinanovic E, Bennett B, Schwenkglenks M (2017) Health-related quality of life in South African patients with pulmonary tuberculosis. PLoS ONE 12(4): e0174605. https://doi.org/10.1371/journal.pone.0174605

¹¹ Lin Y, Liu Y, Zhang G, Cai Q, Hu W, Xiao L, Thekkur P, Golub JE, Harries AD. Is It Feasible to Conduct Post-Tuberculosis Assessments at the End of Tuberculosis Treatment under Routine Programmatic Conditions in China? Trop Med Infect Dis. 2021 Sep 10;6(3):164. doi: 10.3390/tropicalmed6030164. PMID: 34564548; PMCID: PMC8482211.

¹² Nishi MP, Mancuzo EV, Sulmonett N, Almeida IN, César ALA, Miranda SS. Pulmonary functional assessment: longitudinal study after treatment of pulmonary tuberculosis. Rev Inst Med Trop Sao Paulo. 2021 Aug 16;63:e65. doi: 10.1590/S1678-9946202163065. PMID: 34406290; PMCID: PMC8376278.

¹³ Global Action Plan for the Prevention and Control of NCDs 2013-2020 [Internet]. [cited 2022 May 12]. Available from: https://www.who.int/publications-detail-redirect/9789241506236

¹⁴ Harries AD, Ade S, Burney P, Hoa NB, Schluger NW, Castro JL. Successfully treated but not fit for purpose: paying attention to chronic lung impairment after TB treatment. Int J Tuberc Lung Dis. 2016 Aug;20(8):1010-4. doi: 10.5588/ijtld.16.0277. PMID: 27393532.

In another prospective multicentric study from India, Patil *et al.* assessed 500 symptomatic and 500 asymptomatic post-pulmonary TB cases to find out lung function capacity in previously treated cases. In the spirometry assessment, a 42% and 32% obstructive pattern was observed in symptomatic and asymptomatic cases respectively. The combined pattern was observed in 14% and normal spirometry was observed in 46%. Major symptoms in the symptom group reported asthma (79%), cough (48%), and sputum production (39%) ^[15]. Lung function impairment was characteristically observed in post-pulmonary TB, regardless of the duration of treatment. Obstructive pulmonary disease or asthma is common in cases of previously treated TB and is usually detected within 1–10 years of follow-up. Post-tubercular pulmonary dysfunction appears to be a distinct phenomenon manifesting in varying patterns, but mainly as airway obstruction and pre-existing TB is considered a risk factor for COPD. Plit *et al.* and Chung et al. reported that PTB patients generally experience significant lung function complications within 6 months of TB diagnosis and remain stable for 18 months after completion of treatment ^[16].

2.2. Evidence on Pulmonary Rehabilitation

A study on "Pulmonary Rehabilitation and Tuberculosis - a New Approach for an Old Disease" revealed that pulmonary rehabilitation (PR) may be a useful tool in this patient's therapy in the active and also in sequela phases. The benefits of pulmonary rehabilitation include reduction of symptomatology; improvement of functional independence and quality of life, and ability to perform daily activities ^[17].

In Uganda, a pulmonary rehabilitation program conducted by physiotherapists and using less equipment was shown to be feasible in clinical setup and associated with clinically significant improvements in QoL, functional parameters, exercise tolerance capacity, and respiratory outcomes when initiated at the health facility level and later managed at home ^[18]. As many tumor necrosis factor-alpha (TNF α) and interleukins are released as a result of an intense chronic inflammatory state, and patients experience weight loss; pulmonary rehabilitation is not recommended during their treatment. For patients in active stages, mild exercise is usually

¹⁵ Patil S, Patil R, Jadhav A. Pulmonary functions' assessment in post-tuberculosis cases by spirometry: Obstructive pattern is predominant and needs cautious evaluation in all treated cases irrespective of symptoms. Int J Mycobacteriol. 2018 Apr-Jun;7(2):128-133. doi: 10.4103/ijmy.ijmy_56_18. PMID: 29900887.

¹⁶ Plit ML, Anderson R, Van Rensburg CE, Page-Shipp L, Blott JA, Fresen JL, Feldman C. Influence of antimicrobial chemotherapy on spirometric parameters and pro-inflammatory indices in severe pulmonary tuberculosis. Eur Respir J. 1998 Aug;12(2):351-6. doi: 10.1183/09031936.98.12020351. PMID: 9727784.

¹⁷ Global tuberculosis report 2021 [Internet]. [cited 2022 May 16]. Available from: https://www.who.int/publications-detail-redirect/9789240037021

¹⁸ Jones R, Kirenga BJ, Katagira W, Singh SJ, Pooler J, Okwera A, Kasiita R, Enki DG, Creanor S, Barton A. A pre-post intervention study of pulmonary rehabilitation for adults with post-tuberculosis lung disease in Uganda. Int J Chron Obstruct Pulmon Dis. 2017 Dec 11;12:3533-3539. doi: 10.2147/COPD.S146659. PMID: 29270007; PMCID: PMC5729823.

indicated. Heavy exercise was strictly forbidden to avoid hemoptysis ^[19]. On the other hand, a recent study found that pulmonary rehabilitation was successful in individuals who had previously received anti-TB medication. The 6MWT, Borg dyspnea score, tiredness ratings, FEV1, forced vital capacity (FVC), mean arterial oxygen partial pressure (PaO2), and median arterial blood oxygen saturation (SaO2) all improved significantly in patients with reduced lung function ^[20].

According to a recent review, pulmonary rehabilitation improves functional indicators, exercise tolerance (walking test), and overall quality of life. Correct and timely post-treatment malnutrition assessment reduces mortality and morbidity in post-TB patients. A pre-& and post cohort study from Uganda demonstrated PR among 113 participants, and 34 participants were eligible for PR. Among the 29 participants who completed the PR program baseline spirometry characteristics were obstruction 48.2%, restriction 34.4%, and normal 17.2%. Post PR Clinical COPD Questionnaire (CCQ) total score changed to -1.09, Patient Health Questionnaire (PHQ-9) total score changed to -3.17, Karnofsky score changed to 14.48, Incremental shuttle walking test ISWT (m) 89.66, BMI (kg/m2) changed 0.91 and Mid upper arm circumference MUAC changed 0.65 (cm) after 6 weeks of PR completion ^[21]. Hence, this evidence describes a positive outcome on PTBLD overall.

A study on "Yoga-based pulmonary rehabilitation for the management of dyspnea in coal miners with chronic obstructive pulmonary disease: A randomized controlled trial" revealed that statistically significant within-group reductions in dyspnea (P < 0.001), fatigue (P < 0.001) scores, PR (P < 0.001), and significant improvements in SpO2% (P < 0.001) and 6 min walk distance (P < 0.001) were observed in the yoga group; all except the last were significant compared to controls (P < 0.001). Findings indicate that the Integrated Approach of Yoga Therapy benefits coal miners with COPD, reducing dyspnea; fatigue, and PR, and improving functional performance and peripheral capillary SpO2%. Yoga can now be included as an adjunct to conventional therapy for pulmonary rehabilitation programs for COPD patients ^[22].

¹⁹ Akkerman OW, Ter Beek L, Centis R, Maeurer M, Visca D, Muñoz-Torrico M, Tiberi S, Migliori GB. Rehabilitation, optimized nutritional care, and boosting host internal milieu to improve long-term treatment outcomes in tuberculosis patients. Int J Infect Dis. 2020 Mar;92S:S10-S14. doi: 10.1016/j.ijid.2020.01.029. Epub 2020 Jan 23. PMID: 31982628.

²⁰ Visca D, Zampogna E, Sotgiu G, Centis R, Saderi L, D'Ambrosio L, Pegoraro V, Pignatti P, Muňoz-Torrico M, Migliori GB, Spanevello A. Pulmonary rehabilitation is effective in patients with tuberculosis pulmonary sequelae. Eur Respir J. 2019 Mar 14;53(3):1802184. doi: 10.1183/13993003.02184-2018. PMID: 30872556.

²¹ Jones R, Kirenga BJ, Katagira W, Singh SJ, Pooler J, Okwera A, Kasiita R, Enki DG, Creanor S, Barton A. A pre-post intervention study of pulmonary rehabilitation for adults with post-tuberculosis lung disease in Uganda. Int J Chron Obstruct Pulmon Dis. 2017 Dec 11;12:3533-3539. doi: 10.2147/COPD.S146659. PMID: 29270007; PMCID: PMC5729823.

²² Aggarwal D, Gupta A, Janmeja AK, Bhardwaj M. Evaluation of tuberculosis-associated chronic obstructive pulmonary disease at a tertiary care hospital: A case-control study. Lung India. 2017 Sep-Oct;34(5):415-419. doi: 10.4103/lungindia_longindia_522_16. PMID: 28869224; PMCID: PMC5592751.

3. The ETA-PR intervention process

The ETA-PR intervention process is outlined in three steps: patient selection, assessment, and referral. The choice of geographical locations was dependent on the Treatment Units (TUs) where specimen collection services from private labs were available. Nevertheless, it's important to note that coverage within the selected TUs was uneven in a few instances.



Figure 2 Flow chart ETA & Pulmonary Rehabilitation Intervention Outline indicating the steps followed for the ETA-PR intervention

3.1. Patient Eligibility & Selection Process

The district NTEP team shared the patient list for the last two quarters (Q4 2021 and Q1 2022, considering the follow-up month), based on the NI-KSHAY notification register. The WHP state MIS prepared a patient list, date-wise, whose treatment was scheduled to end on a specific date, relying on the treatment initiation date. The WHP state MIS then shared the eligible patient list with the concerned Care Coordinators (CCs) of intervention TUs in the first week of each month.

Patient eligibility

All notified TB (DS TB) cases were enrolled, regardless of the type of case (Pulmonary/EP), the basis of diagnosis (MC/CD), or the type of patient (Public/Private). Drug-sensitive TB patients in both the public and private sectors who initiated treatment on Fixed-Dose Combinations (FDCs) or Anti-Koch Treatment (AKT) and completed at least 24 weeks (168 days) of treatment from the initiation date were eligible for treatment outcome evaluation.

Formula

Estimated Date of Follow-up for ETA = Date of Treatment initiation + 168

The whole process of eligible patients to approach step was maintained in a live MS Excel (as shown in Figure 3) to ease the recruitment process.

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			7	805125	8165290537	Non-Reactive	Non-diabetic	Other		28-12-2021	14-06-2022	12-07-2022	HARKHAND	RANCHI	DOBANDA TU	shauhi K
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Figure 3 Format of eligible patients list preparation for ETA-PR intervention A snapshot of the MS Excel indicating the patient eligibility selection with the approach dates

3.2. Patient assessment

Each patient was approached between the 24th and 28th weeks from the treatment initiation date by the Care Coordinators and assessed (refer to the script for CCs during home visits - Annexure-2) for the following parameters.

- **3.2.1 Process of patient approach:** The current location of the patient's residence was recorded and conveyed to the focal person/sputum collector at the sputum collection center for ease of access during the subsequent visit. In a few instances, patients requested permission to visit a designated place or facility (other than their home, where they felt privacy was compromised). In such cases, no location information was shared with the laboratory.
- 3.2.2 Sputum Collection Process:
 - Handing over the sputum containers to patients: Patients were provided with sputum containers and were briefed by CCs about sputum culture tests for which they would be tested. CCs also provided information about the laboratory from which the sputum collector was scheduled to collect samples within the next three days. Patients were instructed on how to collect morning sputum samples, and this information was documented in the CommCare app (WHP customized app see Section 3.5 for more details).
 - Sputum collection by third-party/ sputum collector appointed by the private labs:
 - The laboratory shared the list of collection centers along with sputum collectors with the relevant CCs of selected TUs. As CCs shared the current location of patients' residences with the collection center/sputum collector, the laboratory received notifications that patients had sputum containers, and they were expected to collect their samples within the next two days (48 hours). Sputum collectors contacted patients before the collection. If patients confirmed that they had collected samples in containers, a sputum collector would visit the patient's home and retrieve the samples accordingly (refer to the script for Laboratory personnel during home visits Annexure-3). Subsequently, the sputum collector submitted the sputum sample at the hub center of the lab for transfer to the facility for the culture process.
 - Sputum quality assurance: Before commencing this activity, an orientation for sputum collectors was conducted. Quality parameters stipulated that the specimen should be a minimum of 2-5 ml, devoid of food particles, and should reach the facility within 72 hours under cold chain conditions. During the collection process, Phlebotomists were instructed to ensure that the sputum sample quantity ranged from 2-5 ml. Upon reaching the central laboratory for the culture test, experts from the laboratory evaluated the sample. In the event

of sample rejection due to quality issues, the samples were collected again from patients following the same process.

- Sputum collectors were required to record the date and time of sample collection at the patient's homes, the moment the sample reached the hub, the departure from the hub, and the arrival at the central laboratory. This practice facilitated an understanding of the turnaround time at different levels, specifically the time it takes for sputum samples to reach the central laboratory from the patient's doorstep.
- Laboratory personnel were directed to process samples promptly, ensuring that the turnaround time for sputum samples reaching the central laboratory did not exceed 72 hours. The tracking of turnaround time was implemented to comprehend its impact on culture results, particularly about contamination. The laboratory adhered to the NTEP guideline's protocol for sputum transfer. Additionally, both laboratory personnel and project staff updated the aforementioned turnaround time in the Google spreadsheet shared by WHP.
- The laboratory conducted a sputum smear examination before culture tests. The culture test results were regularly updated every week for Jharkhand and at intervals of 10, 20, 42, and 56 days for Gujarat. In the case of culture-positive test results, including Non-Tuberculous Mycobacteria (NTM), the laboratory recorded and updated them in a Google spreadsheet. Simultaneously, the WHP state team was notified via email.
- 3.2.3 Measurement of vital parameters: Care coordinators were tasked with recording vital parameters such as blood pressure, pulse rate, respiratory rate, and oxygen saturation (SpO2). The relevant thematic lead trained the corresponding CCs on the proper usage of instruments like digital BP apparatus and pulse oximeter, as well as how to record this information in the CommCare application. The vital parameters listed in Table-2 were collected by the care coordinators as screening criteria for referrals. Any vital parameters report score ≥ 1 (excluding temperature) were considered as criteria for referral (refer to Annexure-4).

Table 2. Vital parameters observed during household visit by the Care coordinators for ETA-						
PR intervention						
Vital parameters	Normal range	Score If	Score			
Temperature	35.8 - 37.3 C	< 35 C or > 41 C	2			
		35 C to 41 C	1			
Oxygen Saturation (SPO2)	95%-100%	X>= 94 to X<=100	0			
		X < 94 to X >=90	1			
		X < 90 to X > 85	2			
		X < 85	3			

Pulse Rate (PR)	60-100/min	X < 60 or X > 100	2
		60 to 100	0
Respiratory Rate (RR)	12-18/min	X < 8	3
		X < 12	2
		X >= 12 to X <=18	0
		X > 18 to X <=24	1
		X > 24 to X < 30	2
		X > = 30	3
Blood Pressure (BP)	120/80 mmhg	Normal = 120/80	0
		Higher normal < 140/90	1
		Hypertension > 140/90	2
		Hypotension < 60	3
		severe Hypertension >	3
		200/100	

3.2.4 Screening for pulmonary impairment: CCs conducted screening for pulmonary impairment following the data collection process outlined in Annexure 4. Based on the pulmonary impairment assessment, if patients were identified as high risk, care coordinators referred these patients to mapped tertiary care centers (District Hospital)/Medical Colleges where pulmonologists and physiotherapists were available. All information was recorded in the CommCare app. A structured scoring-based questionnaire (Table 3), administered by CCs, aimed to collect information and identify the risk status for referral. Being afflicted with at least 2 symptoms out of the 8 listed symptoms or having a Modified Medical Research Council (MMRC) score of ≥ Grade 2 (question no. 9) was considered high-risk, leading to referral to pulmonologists.

Table 3. Scoring-based questionnaire administered by Care Coordinators during initial home							
visit for	visit for ETA-PR intervention						
Q. No	Symptoms	Answers (Tick)					
1	Are you suffering from a cough?						
2	Is there any wheezing sound while breathing? (Patient response						
	only)						
3	Are you taking an inhaler for respiratory complaints?						
4	Do you feel chest tightness?						
5	Do you have a respiratory infection?						
	(Like - Bronchitis, Bronchiolitis, Pneumonia)						
6	Have you been hospitalized due to respiratory complaints?						

7	Do you have a family history of respiratory complaints like COPD/Asthma?	
8	Are you smoking, currently? (Whatever frequency)	
9	 Do you have shortness of breath? Modified Medical Research Council (MMRC) scale Grade 0: Not trouble by breathlessness except on strenuous exercise Grade 1: Short of breath when hurrying or walking up a slight hill Grade 2: I walk slower than then people of the same age Grade 3: I stop for breath after walking about 100 m 	
	 Grade 4 – I am too breathless to leave the house 	

3.2.5 Referral for chest X-rays: CCs also facilitated patient referrals to a CXR facility linked under CGC's iSMART intervention, enabling patients to access free X-rays and AI-assisted report provisions. The figure-4 below illustrates the free X-ray voucher generated by the CCs and handed to the patients during home visits. Other suitable and feasible options requested by the patients were also addressed. WHP MIS created a provider ID for CCs for the referral process. CCs marked the outcome of patients in the voucher as those being investigated for end-treatment evaluation. This allowed the radiologist to differentiate between patients with presumptive and completed treatment cases.

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Figure 4 Chest x-ray voucher generated by care coordinators A snapshot of the free chest X-ray voucher generated by the CCs and provided to the patients

3.2.6 Referral for clinical evaluation: at last, CCs referred all patients to the medical officer of the respective TUs for clinical evaluation, as discussed in the data collection process.

3.3. Patient referral

After being assessed by the CCs and obtaining the CXR report, the patients were referred to the Medical Officers (MOs) at the nearest Treatment Units (TUs) for clinical evaluation.

3.3.1 Clinical assessment by MO: Medical officers assessed the patients to gather information on the history of their symptoms, assessed their general condition (conscious/drowsy), checked for icterus and edema, and prescribed sputum microscopy tests for the end of the Continuation Phase (CP). MOs also evaluated the X-rays provided by the patients. Similarly, for extra-pulmonary tuberculosis, medical officers screened patients for the history of their symptoms, assessed their general condition, checked for icterus and edema, and reviewed other available radiological investigations such as ultrasound (USG), CT-Scan, MRI, chest x-rays (if applicable), or any other investigation suggested by the medical officer or treating physician. All the information was documented by the Medical Officer in Charge (MOIC) in hard copy (Clinical evaluation form - Figure 5), which was then converted to digital copies by the concerned WHP's Care Coordinator (CC) using a Google Form every week (refer to Annexure-5).

	Amilian y of a	
End Treatment Assessment of TB Patients	Clinical Evaluation by MO (At Treatment Outcome) Fun descliption	× I
· Patient Name: Nilerhohai Dhaduk	Form Filling Date	
· NID: 2121 3314	Information, story, younge 🔤	
· TU Name: Punagam		
· Type of Medication (Public/Private): Bivate	P Manuffy	
 Treatment interruption if any (In days): O 	P. East Brighthiam	
Ictorus: Yes/No		
Oedema: Yes/No	 EPTEMPTONE 	
Sputum AFB: (Positive/ Negative/ Not Done):	E. EADAR(DB)EE	
 Chest X ray impression: (Consolidation / Fibrotic lesion (Old Koch's)/ Other respiratory illness/Not Done); 	Elopandia TU(EE)(HNC Sadar TG0(T)(RNC)	
Any laboratory test suggested:	Name of the Gale Coordinator?	1

Figure 5 Clinical evaluation form filled by medical officers (left) and updated online by Care coordinators (right) under ETA-PR intervention

A sample clinical examination sheet is shown on the left here to provide insight into the assessment indicators undertaken by Medical Officers, and the information is subsequently updated online (on the right) by the CCs.

3.3.2 Pulmonary impairment assessment by pulmonologist: Patients with assessed pulmonary impairment symptoms by the CCs were referred to tertiary care for further investigation and clinical assessment by pulmonologists. Pulmonologists screened the patients for the underlying cause of pulmonary impairment or other conditions (e.g., COPD, Asthma, Bronchiectasis, Silicosis, etc.) and prescribed medical treatment accordingly. They also conducted a spirometry test along with a 6-minute walk test (6MWT) for a more comprehensive assessment of pulmonary impairment. After identifying the underlying cause, pulmonologists referred patients to physiotherapists for pulmonary rehabilitation

within the same facility. If patients had other underlying causes like heart disease or any other morbidity, they were referred to the concerned department.

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Age : 57Y	Sex : Male
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Figure 6 Pulmonologist's impairment assessment prescription under ETA-PR intervention

A sample pulmonary clinical examination sheet is provided here to offer insight into the actions undertaken by pulmonologists for high-risk patients.

3.3.3 Pulmonary rehabilitation by physiotherapists: Based on the current pulmonary complaints and a comprehensive evaluation of all patient reports (preferably spirometry and 6MWT) as prescribed by pulmonologists, the physiotherapist recommended exercises (including breathing exercises and upper and lower limb exercises) to enhance pulmonary capacity and reduce activity limitations and symptoms of acute exacerbations.

3.4. Activities in the post-assessment and follow-ups

Follow-ups and system integration were planned at the end of the assessment and/or rehabilitation. All post-assessment activities by the intervention staff and/or liaison with NTEP staff are described here.

- **3.4.1** Liaison with NTEP staff: CCs communicated with STSs and LTs for TB patients who reported culture positives and required further investigations (NAAT/LPA). The physical copy of the culture test was also shared with DTOs, STSs, and LTs for their acknowledgment. CCs also shared the list of untraceable/migrated/refused patients with concerned STSs for necessary action, and the same was acknowledged by the District NTEP team through HSC and Thematic Lead. For NTM+ve cases, a separate list was developed and shared with the respective district team, and further, the MO ensured the follow-up of these cases at the tertiary level. Support letters received from the respective authorities facilitated the implementation of ETA (refer to Annexure 6).
- **3.4.2 Facilitation by treatment supporter:** Treatment supporters or TBHV-facilitated sputum collectors conducted sputum collection and facilitated visits for chest X-rays, in addition to other physical, clinical, and laboratory investigations, including pulmonary rehabilitation.
- **3.4.3** Follow-up by care coordinator: Through telephonic attempts (two attempts), care coordinators followed up with patients one week after referral regarding the clinical evaluation by the MO and chest X-ray. If patients had not undergone a chest X-ray, CCs counseled them and encouraged them to visit. CCs followed up with a pulmonologist 15 days after the referral and recorded information on the underlying cause of pulmonary impairment. CCs also followed up with physiotherapists every month until the patients' outcome on PR.
- **3.4.4 Report receiving mechanism from laboratory and share result with District NTEP:** The laboratory sent a report via email to the WHP state team. The state WHP team shared the AFB and culture results with patients, STS, and DTO for their acknowledgment.
- **3.4.5 DST of culture-positive patients:** Culture-positive patients were further evaluated for Drug Susceptibility Testing (DST) at NTEP-certified Culture and DST labs identified in the public sector, IRL of respective states. The WHP state team coordinated with the laboratory, and samples were transported to the respective Treatment Units (TUs) of the concerned state. The care coordinator communicated with STS & MO IC, and according to NTEP guidelines, patients were further evaluated for Drug-Resistant TB (DR TB). Subsequent episode IDs were generated by STSs, and medicines were started accordingly.

The entire process involved numerous stakeholders from both the intervention team and the NTEP team. A concise overview of their responsibilities is presented in Table 5.

Table 5. Overview	v of HRs and their responsibilities engaged in the ETA-PR intervention
Position	Responsibilities
Strategy Lead	 Coordinate with state officials and provide regular updates on project progress. Monitor project progress every week. Address challenges that may arise at the stakeholder level.
Thematic Lead	 Draft the protocol for project implementation in collaboration with the Strategy lead. Coordinate with project stakeholders. Train the Care Coordinators for project execution. Manage operations in the region. Monitor project implementation. Provide necessary support to the Care Coordinators for the implementation of the project. Verify and validate data captured by the Care Coordinators. Ensure all samples are sent for culture, and reports for the same are documented.
Health System Coordinator	 Overall coordination of the intervention process. Monitoring and supervision of the Care Coordinators. Acting as a liaison between the Care Coordinator and the NTEP staff.
Care Coordinator	 Call patients prior to home visits to avoid subsequent visits and ensure patient availability. Screen patients through a structured questionnaire. Document information on a digital platform. Based on the assessment, refer the patient for necessary consultation. Provide the patient with a referral slip for CXR and sputum collection. Provide the location of the patient to the sputum collector. Provide education to patients regarding the process of providing quality sputum for culture. Follow up with the patient regarding their consultation. (Through telephonic attempts, care coordinators follow up with patients one week after referral regarding clinical evaluation by MO and visiting a health facility for chest x-rays.) Communicate the reports to NTEP staff.
Sputum Collector	 Provide a container to the patient. • Collect a sample from the patient. Transport the sample to the designated site for further investigation. Ensure proper labeling of samples. Transport the sample while maintaining the cold chain.

Culture Laboratory team	 Documentation & coordination Issue the culture & smear report
Medical Officer	 Clinically evaluate patients and document the details in the prescribed format. Provide consultations to patients based on the findings of clinical evaluations.
Pulmonologist	 Screen patients for the underlying cause of pulmonary impairment and prescribe medical treatment accordingly. Identify the underlying cause and refer patients to physiotherapists for pulmonary rehabilitation.
NTEP staff	DTO supervised the process.STS and treatment supporters assisted in the ETA flow.

3.5. Data recordings across the intervention process

The below-mentioned pictures (Figures 7 & 8) provide an overview of data collection with their modes either at the household or at the healthcare facility level. Different modes were used to document the responses at various steps, such as:

- Household level: Patient assessment and vital recordings through the CommCare app, sputum collection, and transportation details in the Google Spreadsheet.
- Healthcare facility level: CXR assessment, medical clinical, and pulmonary examination through physical forms followed by the Google Spreadsheet.



Figure 7 Overview of data collection and flow across the ETA-PR intervention

Flow of data collection concerning point of collection



Figure 8 Snapshots of commcare app for patient assessment during the home visit in the ETA-PR intervention

A snapshot of various stages of patient recruitment and assessment under ETA-PR intervention

3.6. Intervention indicators are designed to summarize information about the ETA-PR intervention for TB patients. They provide comparable and actionable information across different geographic, organizational, or administrative boundaries and can track progress over time. Among others, the table below (Table 6) mentions ETA-PR intervention indicators.

Table 6. Indicators captured under the ETA-PR intervention		
Indicators	Description	
% of patients attempted for a culture test	Proportion of Culture test done	
% of patients rejected for culture test	The proportion of patients rejected (with reasons)	
	for a culture test	
% of patients report culture-negative	The proportion of the sample tested negative	
% of patients report culture-positive	Proportion of the sample tested positive	
% of patients found at high risk for pulmonary	The proportion of patients identified as having	
impairment	high risk for pulmonary impairment	
% of patients referred for pulmonary	The proportion of patients referred for pulmonary	
rehabilitation	rehabilitation	
% of patients completed pulmonary	Proportion of patients completed pulmonary	
rehabilitation exercise	rehabilitation exercise	

3.7. Preliminary findings

About 3,758 TB patients were eligible in Jharkhand and Gujarat, India during Mar-Sep 2022; however, 73% of them were attempted, and half of those attempted responded to be part of the

ETA-PR intervention. The details of the intervention cascade are shown in Figure 8, and the statewise details are indicated in Table 7.



Figure 8 Overview of TB patient numbers in the ETA cascade in both states

Details on ETA-PR intervention beneficiaries and the type of intervention indicating the eligibility to the evaluated

Table	Table 7. Overview of the number of patients in different stages of the ETA-PR intervention in			
Jharl	khand, Gujarat, India during Mar-Sep 2022			
SN	Indicators	Jharkhand N (%)	Gujarat N (%)	
1	No. of eligible patients	1,400	2,358	
2	No. of patients attempted	1,132 (81)	1,644 (69)	
3	No. of patients Responded	515 (45)	1,074 (65)	
4	No. of patients eligible for lab	367	712	
	microbiological examination			
5	No. of patients evaluated for lab	365 (99)	677 (95)	
	microbiological examination			
10	No. of patients eligible for chest X-ray	335	680	
11	No. of patients evaluated for chest X-ray	245 (73)	472 (69)	
12	No. of patients eligible for clinical	459	956	
	evaluation			
13	No. of patients evaluated for clinical	234 (51)	835 (87)	
	evaluation			
14	No. of patients eligible for pulmonary	67	54	
	rehabilitation			
15	No. of patients evaluated for pulmonary	64 (95)	49 (91)	
	rehabilitation			

Various reasons for the higher non-response rate are documented and presented in Figure 9. Table 8 provides an overview of the culture details.



Figure 9 Reasons for non-response (the gap between attempted and responded) in EAT-PR intervention

Note: **Migrated**: Moved to another district/State **Refused**: Didn't provide consent *Untraceable*: Not able to connect due to short address and duplicate mob. No. *Others:* Move to other TUs, Time constraints from the patient side, incomplete treatment duration.

Table 8. Overview of culture outcomes of the ETA-PR patients in Jharkhand, Gujarat, India during				
Mar-Sep 2022				
Intervention site	Culture +ve (%)	Smear +ve (%)	NTM +ve (%)	Culture -ve (%)
Jharkhand (n=365)	6 (2)	5 (2)	6 (2)	302 (96)
Gujarat (n=677)	19 (3)	22 (4)	19 (3)	554 (94)

4. Trainings/ Capacity building

4.1 Capacity building in Jharkhand

Orientation cum training of CGC project staff

A workshop was organized on March 3rd and 4th at Hotel Capitol Residency, Ranchi (Figure 10). Further refresher training was organized on a monthly basis to review the progress of the project, understand the field-level challenges from Care Coordinators, and provide practical solutions for the same. All field coordinators were provided with standardized training that included the following components:

- Rationale for project implementation and protocol.
- Techniques for data collection (live demo was given to CC for data entry).
- Reporting and recording of data.
- Interpersonal skills, verbal and non-verbal communication to effectively communicate and interact with patients.
- Process and techniques involved in recording and reporting vitals.
- Hands-on training to use equipment for recording vitals, i.e., B.P. Apparatus, infrared Thermometer, Pulse oximeter, and troubleshooting minor issues.



Figure 10- Capacity building and orientation for ETA-PR intervention in Jharkhand An orientation training was conducted on March 3rd and 4th, 2022, regarding the various aspects of the ETA-PR intervention.

Orientation cum sensitization of NTEP staffs

In the first week of March 2022, the NTEP staff in Ranchi and East Singhbhum were oriented on end treatment assessment and pulmonary rehabilitation. District Tuberculosis Officers (DTOs) and Chief Medical Officers (CS) of both districts were also sensitized to this intervention. Community Health Officers (CHOs) in Ranchi received orientation on the intervention. The project staff also conducted orientation sessions for private practitioners and medical officers in the public sector for clinical evaluation. Additionally, the pulmonologists and physiotherapists at RIIMS-Ranchi were sensitized for referral and prioritization of patients holding WHP referral slips for pulmonary assessment.

4.2 Capacity building in Gujarat

Orientation cum training of CGC project staff

A comprehensive training session on End Treatment Assessment and Pulmonary Rehabilitation for Care Coordinators was held on the 2nd and 3rd March 2022 at Hotel Regenta Inn, Ahmedabad, Gujarat (Figure 11). This training aimed to enhance the technical skills and medical knowledge of the field team, including Care Coordinators (CCs) and Health System Coordinators (HSCs), and to ensure a comprehensive understanding of project implementation in collaboration with multiple stakeholders and management. The agenda included the following points:

- Goal and objective of ETA-PR intervention
- Field operations
- Stakeholder management
- Referral and patient follow-up
- Detailed discussion on checklists, Google forms, and Commcare application
- Record-keeping and data digitization
- Vital parameters and the use of instruments
- Group activities
- Question/answer session and the way forward

Additionally, efforts were made to enhance the quality of services and motivate CCs through hands-on training in the field, with regular monthly progress reviews.



Figure 11- Capacity building and orientation for ETA-PR intervention in Gujarat An orientation training session took place on 2nd and 3rd March 2022, covering various aspects of the ETA-PR intervention.

Orientation cum sensitization of NTEP staff

During the state-level consultation, discussions were held with the State STDC Cell and WHO consultants regarding the ETA-PR protocol and preliminary findings. Suggestions received, such as ensuring complete ETA follow-up, sharing lab reports with states, and sending samples to IRL, were incorporated into the protocol. Preliminary findings were shared and discussed with the STDC Director in Gujarat (Figure 12).



Figure 12- A state-level meeting was held in Gujarat to update the ETA-PR intervention process and share preliminary findings with NTEP staff

5. Learnings through field implementation

5.1 Mode of learning

To rigorously undertake the learning process scientifically, the process documentation was conducted from March to August 2022 with the following objectives:

- To document the process flow of ETA-PR assessment and referrals for pulmonary rehabilitation.
- To document the challenges faced during implementation and the modifications carried out to strengthen the process efficiency.

During the process documentation, various evaluation methods (Annexure 7) were adopted, and data were collected for validation. Two primary methods have been used to fulfill the above objectives.

• In-depth Interviews: An in-depth interview is an open-ended, discovery-oriented method aimed at obtaining detailed information from all the involved stakeholders. In-depth

interviews are a qualitative research method to explore a respondent's point of view, experiences, challenges, and perspectives.

• **Participatory Observations:** Participatory observations are characterized by the investigator's effort to gain entrance into a process to attain a comprehensive understanding of its internal structure.

Table 5. Overview of process documentation target group and respective data collected during the intervention

Samples	Purpose	Target and frequency of	
		engagement	
Care Coordinator	To understand the challenges in patient	Each month at least 1-2	
(Project)	recruitment, assessment, and referrals	from selected TU	
Health System	To understand the coordination issues	Each month from each	
Coordinator	and challenges	district	
(Project)			
Thematic Leads	To understand the overall process and its	Each month from each	
(Project)	challenges	state	
Strategy Lead	To document the comprehensive and Each bi-monthly		
(Project)	administrative level issues	state	
Medical Officer	To understand the challenges in assessing	Selected MOs from each	
(Health system)	the End Treatment patients and managing	TUs throughout the	
	the advice for re-treatment process		
Pulmonologist	To understand the high-risk patient	Each Pulmonologist	
(Health system)	assessments and referrals for	involved in the process	
	rehabilitation		
Physiotherapists	To understand the prescription patterns	Each Physiotherapist	
(Health system)	on rehabilitative exercises and challenges	involved in the process	
Managers private	To document the challenges in supply	Each lab head from the	
culture Labs	logistics and the sample collection process	district	
(Project)			

5.2 Challenges observed and supportive actions undertaken during the implementation

Challenges Supportive Actions				
1. Recruitment phase to enroll the eligible	1. Recruitment phase to enroll the eligible TB patients			
1. During the initial phase of interventions, it was observed that a few TB patients were already on treatment, even though they had completed 24 weeks of ATT. This was evident despite the treatment status showing "treatment completed" or pending treatment outcome status as per NI-KSHAY records.	To overcome this challenge, patient eligibility was reconsidered starting from the 26th week of the treatment initiation date. Additionally, it was decided to approach patients after the 24th week of treatment completion, ensuring accessibility within the 28th week of treatment completion.			
2. Some patients had been transferred to different geographic locations, even though NI-KSHAY indicates that their residential details belong to the intervention TUs.	The patients with mismatched details between the current TU and the residential TU were thoroughly investigated before recruitment into the cohort. All patients not residing in the intervention TUs were excluded from the recruitment process.			
3. A few private patients were still on treatment even after completing the designated 24-week duration (PTB DSTB cases) as per the protocol. Additionally, some patients had undergone assessment before any contact was made by the intervention team.	 Patient details under treatment were recorded for further assessment, and they were recruited if necessary. Private TB patients who had already undergone clinical evaluation at the end of their treatment were not required to repeat the assessment to avoid additional burdens. Similarly, those who had completed all necessary investigations were excluded from the follow-up cohort. Patients were deemed ineligible for a culture test if they reported taking less than five months of medicine, regardless of their adherence report, due to observed false outcomes in NI-KSHAY. 			
4. Enrolling patients with incomplete addresses and incorrect mobile numbers, as well as industrial workers (diamond and textile industries in Surat), and private hospital patients who only visited for consultations and resided near TUs but obtained medications from intervention TUs, posed challenges.	In situations where patients had incorrect or no mobile numbers, CCs shared updated mobile numbers with sputum collectors through attempted home visits. Patients who could not be contacted by any means or were not willing to participate were excluded.			
2. The primary assessment phase: Initial Scre	ening and Sputum Culture			
1. Collecting sputum at the doorstep by the	To address these challenges, a discussion was			
third-party laboratory and sputum	held, and it was decided that WHP care			

collector remained a challenge. The setback was observed in Jharkhand, where Apollo lab refused to collect sputum from rural areas.	coordinators would provide sputum cups to patients during the visit for pulmonary assessment. The Apollo lab was then tasked with collecting the sputum from the patient's doorstep. After a meeting with Apollo regional representatives in Jharkhand, Apollo lab identified specific areas where they could provide sputum collection services. However, they mentioned facing difficulties in collecting sputum on two occasions due to operational issues at the labs.
2. Details of patients whose assessments were completed by the Care Coordinators (CCs) were provided to the lab agency. However, the lab agency did not regularly follow the provided list and failed to collect samples from the patients within the specified timeframe, leading to the exclusion of patients from the study.	A discussion and meeting were held among WHP Head Office (HO) and state teams, leading to the decision to recruit two sputum collectors for Jharkhand (one for each district).
3. The secondary assessment phase at th referral	e health facility for clinical assessment and
1. Medical Officers were unwilling to fill out the referral clinical assessment sheet provided by WHP. Formative observations revealed that MOs were reluctant to engage in paperwork, and some of the forms submitted by them were not properly filled out.	Continuous advocacy efforts were made with MOs to encourage them to consider ETA as a distinguishing trend in their clinical practice. An endorsement letter or communication from the DTOs to MO for clinical evaluation was also circulated to medical officers by the DTOs.
2. Clinical evaluation was pending for many patients in the private sector because private physicians refused to complete the necessary paperwork for the patients.	Continuous advocacy was conducted through the Care Coordinators to facilitate the assessment of these patients and coordinate with the doctors.
3. During the facility assessment, it was observed that there is a need for further discussion on the initial assessment parameters to evaluate lung health for pulmonary rehabilitation.	The care coordinator recorded five vital parameters—pulse rate, respiratory rate, temperature, heart rate, and oxygen saturation—for pulmonary rehabilitation assessment. After multiple consultations with physiotherapists and pulmonologists, it was determined that only oxygen saturation and respiratory rate were considered for the referral of patients for pulmonary rehabilitation.

4.	Patients were sent to pulmonologists for further assessment, and based on the best course of treatment, they were referred to physiotherapists. It was observed that a very small number of patients were referred for pulmonary rehabilitation.	There is a need to develop a structured national programmatic guideline, recommendations criteria, or clinical standard for pulmonary rehabilitation. Physiotherapists should specialize in Cardiopulmonary therapy to prescribe differential rehabilitation programs based on the clinical status of Pulmonary TB patients.
5.	Some TB patients refused to visit health facilities for clinical assessment due to previous poor experiences with patient support provided by hospital staff. In some instances, patients forgot the referral or assessment form, which must be carried with them when they visit.	Continuous advocacy was carried out through the CCs for these patients to facilitate the assessment, and the district NTEP team was sought to ensure the assessment at the health facility. TBHVs were engaged (in Surat) as gatekeepers at the tertiary care facilities to ensure consultation with pulmonologists and to complete all the advanced investigations as indicated by the pulmonologists.
6.	Some private patients were reluctant to visit providers' clinics at the end of their treatment, as each visit involved some costs. Hence, there were a few cases of reluctance among private patients.	Private patients were briefed about the free services provided under the interventions, but dropouts were still observed in this cohort.

6. Recommendations

Even though the intervention was carried out in a small geographic area of the country, the team has substantial data for discussion and recommendations for wider scale-up. For each challenge that was faced, appropriate corrective action was undertaken. The lessons learned during the current implementation are listed below.

- 1. Assessment of treatment outcome: One of the most significant learnings is that although standard clinical and radiological evaluations of patients at the start of anti-TB treatment and during treatment monitoring can identify initial sequelae, the end of treatment provides an opportunity to confirm cure from TB or assess post-TB sequels. To identify and measure any potential impairment brought on by post-TB lung disease, a thorough comprehensive assessment should be conducted by systematically trained staff. The evaluation should concentrate on standard clinical, bacteriological, radiological examination criteria, and the functional impact of TB sequelae and any necessary pulmonary interventions.
- 2. Monitoring of the Treatment Outcome: It was learned that updating outcomes in Nikshay requires close monitoring at the time of treatment completion. A cohort-based dashboard within Ni-kshay may assist decision-makers in ensuring the completeness of

the end treatment assessment results and treatment outcomes in a timely manner (preferably within a week). However, additional efforts should be carried out to validate the information.

- 3. Monitoring of the Retreatment Rate / Relapse Rate: Apart from treatment outcomes, another set of indicators that the state should monitor includes the retreatment rate, the duration between treatment outcomes, and new episodes in previously treated cases. The number of episodes among previously treated patients should also be monitored. The daily regimen and newer PMDT guidelines provide enough evidence as of now. However, the state should identify pockets where the relapse rate of previously treated patients (both from public and private PHIs) is higher and prioritize them for end treatment assessment interventions, based on the above-mentioned learnings.
- 4. Operational Research to establish the three-tier mechanism to ensure continuum of Care: The above intervention offers a broad scope of learnings and opportunities to identify areas where operational research would provide more implementation clarity. Research findings should inform the development of state-specific Standard Operating Procedures (SOPs) for end-treatment evaluation by front-line workers. The execution mechanism within the existing health system, as well as the referral and support mechanism to link patients with pulmonologists/physiotherapists, etc., should be adopted for local implementation based on available resources.
- 5. Operational guidelines for Presumptive NTM diagnosis and Management: The identification of culture-positive reports due to NTM highlighted the need for a reconfirmation protocol for Non-tuberculosis mycobacterium diagnosis. Management should be considered based on the clinical condition of the patients. Field visits and results underscored the necessity to establish a programmatic guideline for presumptive NTM diagnosis and management.
- 6. Pulmonary Rehabilitation (PR) among patients with lung impairment: A small yet significant proportion of patients continued to exhibit abnormal pulmonary functions even after successfully completing treatment. The NTEP should collaborate with NCD programs (NPCDCS) to develop guidance for pulmonary rehabilitation among patients with lung impairment. Specific screening criteria and instructions on the roles and responsibilities of staff should be identified for pulmonary rehabilitation during the post-treatment period. Pulmonary rehabilitation encompasses a comprehensive package of interventions, including exercise, education, nutrition, self-management activities, and psychosocial support.

7. Annexures

Annexure-1: Case studies

A case study from Jharkhand

A patient named XXXXXX, age - 56, male residing in garahtoli near kantatoli, Ranchi. His family has three family members, including his wife and son. On 03/10/2020 his son, named Pritish Chaudhary, age 24, has severe cough complaints. Dr.Mukherji referred him to the government facility and as per their presumptive symptoms, he was undergone through clinical, radiological and microscopic examinations and finally, his son was diagnosed with pulmonary Drug Sensitive Tuberculosis. The medicine was started and contact tracing of their family occurred by WHP team under THALI project. All their family members were screened



for sputum microscopy then, and the results were negative for Ajay Chaudhary and his wife.

Later, Ajay Chaudhary complained of chest pain, weight loss and fever. He was going to kamal medicine, and the pharmacist gave him medicine as per their complaints, but the symptoms did not subside and he visited the kamal medicine again and asked for another medicine as he was not getting relief from their symptoms. Then the pharmacist of kamal medicine asked him to go for a chest x-ray and was later diagnosed with TB. He regularly took medicine and called on the number as STS briefed him. He also underwent the end of IP test & end of CP test which were negative. STS also linked their account with Nikshay Poshan Yojna.

He was recruited under End Treatment Assessment & Pulmonary Rehabilitation intervention in the Sadar & Doranda TU of Ranchi district. Under the eligible patients' list, Ajay Chaudhary was a beneficiary, and WHP care coordinator Piu Naskar had contacted him for the pulmonary assessment and sputum culture. While the pulmonary assessment, she screened Ajay Chaudhary for vital parameters i.e, Respiratory Rate, Oxygen Saturation, Blood Pressure, Temperature and Pulse Rate and MMRC scale, including a questionnaires-based tool in which he was found at high risk for pulmonary impairment. She also gave him a free x-ray voucher for a chest x-ray at the end of the treatment evaluation.



He visited the pulmonology department at RIIMS hospital, where Dr. Brajesh Mishra – a pulmonologist -- screened him and gave symptomatic treatment for breathlessness. The pulmonologist referred him to the physiotherapy department and cardiology department for Echocardiography. Physiotherapists provide home-based exercises i.e, breathing exercises and upper and lower limb endurance exercises. WHP also provided referral slips that prioritized the patients at RIIMS pulmonology department.

Thus, Mr. Ajay Chaudhary and his family got benefit

a lot through WHP through various interventions like contact tracing, iSmart intervention, Adherence technology and lastly, end treatment assessment & pulmonary rehabilitation. All the family members will be screened for post-treatment follow-up in the upcoming month.

A case study from Gujarat

Case-1

The ETA team screened a patient aged 45 years female and found to be at high risk based on the

pulmonary symptoms. Thus, she was referred to Civil hospitals for consultation of Pulmonologists. The patient denied it multiple times and refused to visit the Civil hospital despite multiple follow-ups. The sputum was collected and sent for microbiological analysis per intervention protocol. In the meantime, project staff contacted her multiple times as she didn't turn up for end treatment assessment and consulting with pulmonologists. As soon as the lab report confirmed NTM +ve, the project staff visited them



personally again to convince her and consult the specialist at the civil hospital. After multiple counseling, she was convinced to visit the Civil hospitals. In due course, she consulted the Pulmonologists and is under treatment now.

Case-2

Komal Gondaliya, A 22 year's girl has just completed her treatment with cured outcome on 10th March 2022 for a second episode of recurrence. Previously, She took the complete course of treatment in 2020 also. There was no history of TB in his family. The Care Coordinator (Dharmishtha) came to know about this patient during a home visit under ETA intervention. Care Coordinator found that she was still taking medicines for TB till that time. She complained of chest pain and appetite loss during the Pulmonary Rehabilitation



assessment. She also had problems with routine daily work. Care Coordinator referred her to SMIMMER medical college after initial screening as per decided protocol. She provided her sputum sample for the culture test too.

"A new hope came to her daily life again as she had just completed her long duration treatment of TB with "Treatment completed" outcome. She wanted to re-open her beauty parlor and start an income to be financially independent. Unfortunately! She is again on treatment for NTM (Non Tuberculous Mycobacterium) but she is motivated to be cured again"

Her mucopurulent from chest was referred for CBNAAT test as per the doctor's suggestions and diagnosed positive for TB. In the meantime, she also found NTM positive in Culture report dated 5th Apl.2022. Care Coordinator updated the report to Komal and visited the provider of SMIMMER along with her. Doctor recommended her NTM treatment as per the culture report. Obviously, She was depressed with the new infection but the Care Coordinator counselled her for complete treatment and mental health. At present, she is in Treatment. Her successful outcome is awaited.

Case-3

Bahadur Singh Vaghela is a 65 years old man living with his family in Gandhinagar, Gujarat. There are seven adult members in his family and he had no single history of TB among them. He was a labourer by profession and had an asset of large land proportion. He used to sell small pieces of land for livelihood. Bahadur Singh was first diagnosed with TB in 2018 when he complained of severe cough and chest pain. He completed his treatment with the Cured outcome at that time

at a government facility at Gandhinagar.He had been substance abused for a long time. Consumption of Alcohol, smoking Bidi (Kind of Cigarette), and chewing tobacco was the routine in his daily life. He never left from his addiction even he was in treatment of TB during multiple episodes. He completed his fifth TB recurrence episode on 5th April 2022 with a cured outcome.

Bahadur Singh complained about his severe cough, chest tightness including breathlessness. Care Coordinator (Hetal) identified this patient during a Home visit under ETA intervention. Care Coordinator for referred him Pulmonary Rehabilitation, including clinical assessment to GMERS medical college-Gandhinagar after initial screening. She counselled him for free culture test and his sample was referred for the same test with the support of hired Lab. Agency.



"A patient full of life enjoyed his days happily. His only philosophy to "CHINTA CHHODO, KHAO PIYO MAST RAHO" (Stop worrying, Eat-Drink and Be Happy). Currently, He is on treatment with a sixth episode of recurrence. He never thought that his substance abuse will cause his routine life to worsen and disturb his family's life too"

Bahadur Singh diagnosed TB positive in culture report again on 3rd May2022. His same sample was found TB positive in IRL Ahemdabad during re-confirmation on 9th May2022. In addition, there was no any resistance confirmed by IRL Ahemdabad in First Line LPA. On that day his severity grown up. In the meantime, Bahadur Singh again called and updated his condition to the Care Coordinator. He has referred again to GMERS medical college. The doctor of GMERS medical college again suggested him for CBNAAT Test at Civil hospital, where he diagnosed MTB detected with Rifampicin resistance on 12th May 2022. Moreover, he was also monitored as per the Differentiated Care model. His treatment started from 13th May2022. Currently, Bahadur Singh is on treatment and feeling better now. He also minimized the usages of substance currently after MH sessions. His family members were also supportive for him and caring routinely. NTEP team also monitoring his treatment adherence through MERM technology and keep regular follow up. A successful result is awaited from his treatment.

Annexure-2: Script for Care Coordinator

- Name:
- Brief about the organization and Project:
- Take consent:
- Objective:
- Ask About General Health Condition:
- Pulmonary Assessment:
- Assessment & record of Vital Parameteres:
- Referral if any abnormility (PR & Vital Parameteres):
- End Treatment Evaluation (Referal for X'ray & Clincal Examination by MO-PHI):
- Spot sample collection along with request form and submitted to designated place:

Annexure-3: Script for Laboratory

नमस्कार / नमस्ते मेरा नाम......है | मैं सूप्राटेक लैब एजेंसी से बोल रहा / रही हूँ | यह एजेंसी WHP (World Health Partners) और स्वास्थ्य विभाग के साथ मिलकर टीबी उन्मूलन के क्षेत्र में काम कर रही है | क्या मेरी बात (मरीज का नाम) से हो रही है | "**अगर हाँ (मरीज के परिवार के सदस्य होने पर भी) तो बातचित जारी रखें | अगर नहीं तो अनुकूल समय लेकर फिर से कॉल करें |**"

जैसा की आपके टीबी बीमारी के इलाज का कोर्स अब पूरा हो गया है | इसी क्रम में अब आपके कफ (गलफर) की एक बार फिर से जांच होनी है | इस जांच का नाम लिक्विड कल्चर (MGIT 960) है | इस जांच के बाद पता चलेगा की आपके शरीर में अभी टीबी का बेक्टेरिया है या नहीं | इस जांच के लिए आपसे कोई पैसा नहीं लिया जायेगा |

अभी एक-दो दिन पहले WHP के एक फील्ड ऑफिसर ने आपको स्पुटम कप (डिब्बी) दिया होगा | जिसमे आपको अपने सुबह का कफ जमा करके रखना है | मेरे एक साथी (नाम बताये) आपके घर पर वो भरा हुआ स्पुटम कप (डिब्बी) लेने के लिए (**दिन और समय बताये**) आयेंगे | क्या आप अपने घर पर कफ देने के लिए उपलब्ध रहेंगे ? **मरीज अगर हाँ कहता है तो कफ निकालने का तरीका बताकर धन्यवाद** के साथ कॉल समाप्त करें | अगर मरीज ना बोलता है तो उससे समय लेकर उनकी सुविधा अनुसार उनके यहाँ से स्पुटम कप (डिब्बी) लेने जाये |

Request Form for Test

Name of the patient:				
NikshayID:Age:	Gender:(M/F)	.Mobile		
Address:				
Laboratory Name:				
Refer by CC (WHP):Mobile				
Date (DD/MM/YY)	Time:/Place			
Type of Test(Tick):				
Liquide Culture(MGIT-960):				
DST:				

Signature:

Annexure-4: Referral Slip for Pulmonary Assessment of Persons with TB

)

Name of the patient: Age: Gender (M/F) Address: Name of TU: Refer to Medical Colleges (NI-KSHAY ID: Mobile

Name of PHI: Refer by:

Reason for Referral:

(Tick for any alter parameters)

Q. No	Symptoms Answers (Tick)		
1	Are you suffering from a cough?		
2	Is there any wheezing sound while breathing?		
	(Patient response only)		
3	Are you taking an inhaler for respiratory complaints?		
4	Do you feel chest tightness?		
5	Do you have respiratory infection?		
	(Like - Bronchitis, Bronchiolitis, Pneumonia)		
6	Have you been hospitalized due to respiratory complaints?		
7	Do you have a family history of respiratory complaints like		
	COPD/Asthma?		
8	Are you smoking, currently? (Whatever frequency)		

9. Do you have shortness of breath?

If yes, please "Tick" given below score as per (Modified Medical Research Council) MMRC scale -

Grade 0 – Not trouble by breathlessness except on strenuous exercise

Grade 1 – Short of breath when hurrying or walking up a slight hill

Grade 2 – I walk slower than then people of the same age

Grade 3 – I stop for breath after walking about 100 m

Grade 4 – I am too breathless to leave the house

Vital Parameters

SN	Vital parameters	Current Status	Normal range	Score If	Tick if alter from Normal range
1.	Temperature		35.8 - 37.3 C	< 35 C or > 41 C 35 to 41	
2.	Oxygen Saturation (SPO2)		95%-100%	X>= 94 to X<=100 X < 94 to X >=90 X < 90 to X > 85 X < 85	
3.	Pulse Rate (PR)		60-100/min	X < 60 or X > 100 60 to 100	
4.	Respiratory Rate (RR)		12-18/min	X < 8 X < 12 X >= 12 to X <=18 X > 18 to X <=24 X > 24 to X < 30 X > = 30	
5.	Blood Pressure (BP)		120/80 mmhg	Normal = 120/80 Higher normal < 140/90 Hypertension > 140/90 Hypotension < 60 severe Hypertension > 200/100	

Source- differentiated care intervention scoring criteria

Referral criteria:

- Suffering from at least 2 symptoms out of 8 listed symptoms in the above.
- MMRC = > Grade 2 (question no.9)
- Any vital parameters reports score =>1 (except temperature)

Annexure-5: End Treatment Assessment Questionnaire of Persons with TB

- Patient Name:
- NID:
- TU Name:
- Type of Medication (Public/Private):
- Treatment interruption if any (In days):
- Icterus: Yes/No
- Oedema: Yes/No
- Sputum AFB: (Positive/ Negative/ Not Done):
- Chest X ray impression: (Consolidation / Fibrotic lesion (Old Koch's)/ Other respiratory illness/Not Done):
- Any laboratory test suggested:

Annexure-6 Supporting Letters

પરીપત્ર:-

સુરત મહાનગરપાલિકા ખાતે ચાલતા નેશનલ ટીબી એલીમીનેશન પ્રોગ્રામ અંતગંત સેન્ટ્રલ ટીબી ડીવીઝન – ન્યુ દિલ્હીનાં નિર્દેશાનુસાર તથા સુચના મુજબ વર્લ્ડ હેલ્થ પાર્ટનર લારા CGC (Closing the Gap in TB Care Cascade) પ્રોજેક્ટ હેઠળનાં સ્ટાક દારા જે પલ્મોનરી ટીબીનાં દર્દીની સારવાર પુરી થાય (૨૪ અઠવાડીયા) તેમનાં કોલો–અપ પ્રોજેકટ હેઠળ (૧) મેડીકલ ઓફિસર દારા કલીનીકલ તપાસ (ર) એકસ-રે ચેસ્ટ તપાસ (૩) લીકવીડ કલ્ચર (MGIT-960) તપાસ કરવાની થાય છે, જેની તમામ કામગીરી CGC પ્રોજેક્ટ સ્ટાક લારા ગૃહ મુલાકાત કરી, પેશન્ટને રેકરલ જે તે હેલ્થ સેન્ટર પર કરવામાં આવશે. જેમાં તેનું નિયત ફોર્મ નીચે મુજબની વિગત પેશન્ટ લઈને આવશે જે મેડીકલ ઓફિસરશ્રી દારા ભરી એનટીઈપી સ્ટાકને જમા કરાવવાનું રહેશે.

orting Format for Medical Officer (End Treatment Assessment)

સદર પ્રોજેકટમાં તમામ સ્ટાક દ્વારા પુરતો સહયોગ મળી રહે તે અંગે મેડીકલ ઓફિસરશ્રીએ

મોનીટરીંગ કરવા જણાવવામાં આવે છે.

સદર પરીપત્રનો અચુક અમલ કરવા જણાવવામાં આવે છે.

પીએચડી/એનટીઈપી/૪૪૭ તાઃ ૨૫/૦૨/૨૦૨૨

નેટેડ્રેડ્રિંગ્રેડ્રિંગ્રેડ્રિંગ્રેડ્રિંગ્રેડ્રિંગ્રેડ્રિંગ્રેડ્રિંગ્રેડ્રિંગ્રેડ્રિંગ્રેડ્રેડ્રિંગ્રેડ્ર સરત મહાનગરપાલિકા

નકલ સા.ર. :– આરોગ્ય અધિકારીથ્રી પ્રતિ જાણ માટે. જ રાસ્ટામાં માર્ગિકો એઇકોર્ડ્સ, તમામ અર્બન હેલ્થ સેન્ટર પ્રતિ જાણ તથા અમલ માટે. MI DUAL CAMERA



ગાંધીનગર મ્યુનિસિપલ કોર્પોરેશન બહુમાળી ભવન, પ્રથમમાળ, સેકટર-૧૧,ગાંધીનગર-૩૮૨૦૧૧

કોનનંબર-૦૭૯-૨૩૨ ૨૦૪૪૦,કેકસનંબર-૦૭૯ ૨૩૨૨૧૪૧૯ ક્રમાંક:ગાંમનપા/એન એચ.એમ/ટીબી/ડુ:)/૨૦૨૨ 41.00/08/2022 પરિપત્ર :-

ગાંધીનગર મહાનગરપાલિકા ખાતે ચાલતા નેશનલ ટીબી એલિમિનેશન પ્રોગ્રામ અંતર્ગત સેન્દ્રલ ટીબી ડીવીઝન-ન્યુ દિલ્हીના નિર્દેશાનુસાર તથા સૂચના મુજબ વર્લ્ડ ફેલ્થ પાર્ટનર ઘારા CGC (Closing The Gap in TB Care Cascade) प्रोचेंडट हेठળના સ્ટાફ ઘરા જે પલ્મોનરી ટીબીના દર્દીની સારવાર પુરી થાય (૨૪ અડવાડિયા) તેમના ફોલો-અપ પ્રોજેકટ ફેઠળ (૧) મેડિકલ ઓફિસર દ્વારા ક્લિનિકલ તપાસ (ર)એક્સ .રે ચેસ્ટ તપાસ (3) લીકવીડ ક્લચર (MGIT -960) તપાસ કરવાની થાય છે, જેની તમામ કામગીરી CGC પ्रोक्षेस्ट स्टाइ ब्रास जूह मुलाझत हरी,पेशन्टने रेइरल के ते हेल्य सेन्टर पर हरवामां આવશે.केमां तेनुं નીચે મુજબની વિગત પેશન્ટ લઇને આવશે જે મેડિકલ ઓકિસરથી દ્વારા ભરી એનટીઈપી સ્ટાફને જમા કરાવવાનું રહેશે.

Reporting Format For Medical Officer (Ent	Terretories
Patient Name -	(reatment Assessment)
NID :-	
TU NAME :-	
Sputum AFB :- Positive/ Negative	
Type of Medicine :- Public / Private	
Treatment Interruption, if any (In days)	
Icterus :- Yes / No	
Oedema :- Yes / No	
Chest X-Ray Impression / Report	
Any Laboratory Test Suggested	

સદર પ્રોજેકટમાં તમામ સ્ટાક દ્વારા પૂરતો સહયોગ મળી રહે તે અંગે મેડીકલ ઓફિસરશ્રીએ મોનીટરીગ કરવા જણાવવામાં આવે છે.

સદર પરીપત્રનો અચૂક અમલ કરવા જણાવવામાં આવે છે.

शहेरी टी.जी. ओड़िसर ગાંધીનગર મહાનગરપાલીકા



Annexure-8: Interview guide for ETA recruited patients

- 1. General introduction and consent
- 2. Can you tell us in brief about your TB treatment journey so far (Probe: Emphasis on publicprivate transitions, accessibility to the treatment, ADRs)
- 3. Please tell us about your acceptance for evaluation at the end of your treatment (Probe: Explore the knowledge of the patient on the importance of ETA, How they have perceived the CC assessment, Interaction with CC)
- 4. As per the patient view, how do they react to the end treatment referrals to the Medical Officer and/or to the Pulmonologists for their clinical assessment (Probe: Access to healthcare, additional expenses, perception of visiting healthcare facilities with the absence of any clinical symptoms)
- 5. Please consider the CC interactions and investigate the accuracy of the referrals and nonreferrals. Note down the challenges font by the CCs while recruiting the ETA patients.
- 6. Discuss the patient's perception and acceptance of the ETA. Consider the personal and anticipated issues for visiting healthcare facilities.

Annexure-9: Glimpses from the field

From Jharkhand



Field assessment by CC during the first home visit



Field assessment by CC during the first home visit

From Gujarat



Meeting with Medical officer on ETA for Clinical Assessment



Sharing intervention update with HOD pulmonologist -SMIMMER



Field assessment by CC during the first home visit