REPUBLIC OF NAMIBIA

MINISTRY OF HEALTH AND SOCIAL SERVICES

National Guidelines for the Management of Tuberculosis

Fourth Edition 2019

END TB

Republic of Namibia
Ministry of Health and Social Services

National Guidelines for the Management of Tuberculosis

Directorate of Special Programmes
Division: Health Sector Response
National Tuberculosis and Leprosy Programme

Private Bag 13198
Windhoek
Republic of Namibia
Tel: 061-2035034
Fax: 061-252740

Fourth Edition
March 2019

Vision:

A Namibia free of tuberculosis and leprosy.

Mission statement

Universal access to tuberculosis and leprosy care and prevention per international standards, while addressing the determinants and consequences of the diseases in line with the Sustainable Development Goals.

This edition printed and published by:

Ministry of Health and Social Services
Directorate of Special Programmes
National Tuberculosis and Leprosy Programme
Private Bag 13198
Windhoek, Namibia

Third Medium-term Strategic Plan for Tuberculosis and Leprosy, 2017/18-2021/22

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF RECORDING AND REPORTING TOOLS FOR TUBERCULOSIS

PREFACE

Tuberculosis (TB) is among the top ten most common causes of death globally and as a single infectious disease is top among infectious diseases. Furthermore, it is noted as the top cause of death among people infected with the human immunodeficiency virus (HIV). Despite recent decreases in the number of notified cases, Namibia still has a high TB burden and is included among the top 30 high-burden TB countries by the World Health Organisation (WHO). In the 2018 Global TB Report, the estimated incidence rate of TB in Namibia was 423/100,000. The same report estimated that 60 people per 100,000 populations died of TB in Namibia, which is a concern, for a disease that is curable and preventable.

Namibia, has made a significant progress in reducing the incidence of TB and ensuring that TB patients successfully complete treatment. In addition, the latest recommended technology in diagnosing TB, including molecular tests was adopted and access to these services ensured. However, this technology has yield an increasing number of patients with drug-resistant tuberculosis, which is difficult to cure and requires complex treatment. This form of TB is one of the greatest threats to the achievement of successful outcomes. The Ministry of Health and Social services remains vigilant to address the current threats of Drug resistant TB.

There have since been a number of developments both locally and internationally which have informed the need to continuously update the guidelines.This fourth edition of the guidelines provides updates based on new knowledge and lessons learnt during the implementation of TB care and prevention activities in the country. The areas that have received particular attention were: TB diagnostics, treatment of drug-susceptible TB, treatment of drug resistant TB with new medicines and regimens, and patient centred care, which includes addressing of socioeconomic and rehabilitation needs of patients. There has also been a revision of the TB/HIV section and an inclusion of common co-morbidities such as diabetes, alcoholism and malnutrition.

The *National Guidelines for the Management of Tuberculosis* was informed by various stakeholders as well as international publications, in particular those released by WHO. The guidelines are intended for use by all health care workers involved in the management of TB suspects and patients. The technical staff at the national and regional levels will be responsible for ensuring adherence to these guidelines through orientation, training and supervision. I am, therefore, confident that the guidelines will provide the needed guidance in management of TB in Namibia.

Finally, I would like to express my appreciation for the financial and technical support received from WHO, KNCV TB Foundation and Centres for Disease Control and Prevention, to finalize the guidelines.

Mr B. Nangombe
Executive Director (MoHSS)

LIST OF ABBREVIATIONS

ACSM	Advocacy, Communication and Social Mobilisation
AFB	Acid-Fast Bacilli
AIDS	Acquired Immune-Deficiency Syndrome
Am	Amikacin
Amx/Clv	Amoxicillin/Clavulanate
ART	Antiretroviral Therapy
ARV	Antiretroviral (Medicine)
BCC	Behaviour-Change Communication
Bdq	Bedaquiline
CB-DOT	Community-based Directly Observed Treatment
CCRC	Central Clinical Review Council of the NTLP
CDC	United States Centres for Disease Control and Prevention
Cfx	Ciprofloxacin
Cfz	Clofazimine
CHPO	Chief Health Programme Officer
Clr	Clarithromycin
Cm	Capreomycin
CMO	Chief Medical Officer
CMS	Central Medical Stores
CPT	Co-Trimoxazole Preventive Therapy
CrCl	(Renal) Creatinine Clearance
Cs	Cycloserine
DCC	District Coordination Committee
dlm	Delamanid
DM	Direct Microscopy
DOT	Directly-Observed Treatment
DOTS	Directly Observed Treatment - Short Course (WHO Strategy)
DR-TB	Drug-Resistant TB
DSP	Directorate of Special Programmes
DST	Drug Susceptibility Testing
Ds-TB	Drug-Susceptible TB
DTLC	District Tuberculosis and Leprosy Coordinator
E	Ethambutol
ESR	Erythrocyte Sedimentation Rate
Eto	Ethionamide
FDC	Fixed-Dose Combination
FLD	First Line (Anti-TB) Drugs (Or Medicines)
GFATM	Global Fund to Fight AIDS, TB and Malaria
GLC	Green Light Committee
GRN	Government of The Republic of Namibia
H	Isoniazid
HAART	Highly Active Anti-Retroviral Therapy
HCT	HIV Counselling and Testing
HCW	Health-Care Worker
HIV	Human Immunodeficiency Virus

Hr-TB	Confirmed Rifampicin Susceptible, Isoniazid-Resistant TB
IEC	Information, Education and Communication
Ipm/Cln	Imipenem/Cilastatin
IPT	Isoniazid Preventive Therapy
ITECH	International Training and Education Centre for Health
IUATLD	International Union Against Tuberculosis and Lung Disease (The Union)
KAP	Knowledge, Attitude, Practices
Km	Kanamycin
KNCV	*Koninklijke Nederlandse Centrale Vereniging* (Royal Dutch Tuberculosis Association)
Lfx	Levofloxacin
Lzd	Linezolid
MDR-TB	Multi-Drug-Resistant Tuberculosis
Mfx	Moxifloxacin
MOTT	Mycobacteria Other Than Tuberculosis
MTP-I	First Medium-Term Plan (For TB)
MTP-II	Second Medium-Term Plan (For TB and Leprosy)
MTP-III	Third Medium-Term Plan (For TB and Leprosy)
MoHSS	Ministry of Health and Social Services
NGO	Non-Governmental Organisation
NIP	Namibia Institute of Pathology
NNRTI	Non-Nucleoside Reverse Transcriptase Inhibitor
NRTI	Nucleoside Reverse Transcriptase Inhibitor
NTLP	National Tuberculosis and Leprosy Programme
Ofx	Ofloxacin
OR	Operational Research
PAS	Para-Amino Salicylic Acid
PHC	Primary Health Care
PLHIV	People Living With HIV
PCP	Pneumocystis Pneumonia
PTB	Pulmonary Tuberculosis
R	Rifampicin
RACOC	Regional Aids Coordinating Committee
RMT	Regional Management Team
RTLC	Regional Tuberculosis and Leprosy Coordinator
S	Streptomycin
SAT	Self-Administered Treatment
SHPO	Senior Health Programme Officer
SLD	Second Line (Anti-TB) Drugs/Medicines
STI	Sexually Transmitted Infection
TB	Tuberculosis
TIPC	Therapeutics Information and Pharmaco-Vigilance Centre
TPT	Tuberculosis Preventive Therapy
UNAM	University of Namibia
USAID	United States Agency for International Development
WHO	World Health Organisation
Z	Pyrazinamide

1 INTRODUCTION

1.1. The National Tuberculosis and Leprosy Programme (NTLP)

A national programme for tuberculosis (TB) and leprosy was established in 1991 under the Primary Health Care (PHC) Directorate and was moved to the Directorate of Special Programmes (DSP) upon the latter's formation in 2004. The first edition of the National Guidelines for the Management of Tuberculosis was published in 1995, followed by the second edition in 2006 and the third in 2012. These guidelines will be implemented within the framework of Third Medium-term Plan for Tuberculosis and Leprosy (TBL MTP-III) and in line with Namibia's contribution to the global End TB Strategy.

1.2. Burden of Tuberculosis

Namibia has one of the highest estimated incidence rates of TB in the world, with 8,108 cases notified in 2018, which translates to a case notification rate (CNR) of 336/100,000. The high case load is attributed mainly to the HIV epidemic as reflected by an HIV prevalence of 17.2% among ante-natal clinic attendees in 2016 and an HIV prevalence rate of 35% among TB patients in 2018. The number of notified cases, however, has been consistently declining from a peak of 16,156 cases in 2004.

There are significant regional differences in TB case notification rates in the country. In 2018, Khomas, Ohangwena, Erongo and Kavango regions respectively reported the highest cases in absolute numbers. The per capita disease burden was highest in Omaheke, Hardap, //Kharas and Erongo. Khomas region accounted for the highest proportion (16%) of the country's TB disease burden in 2018.

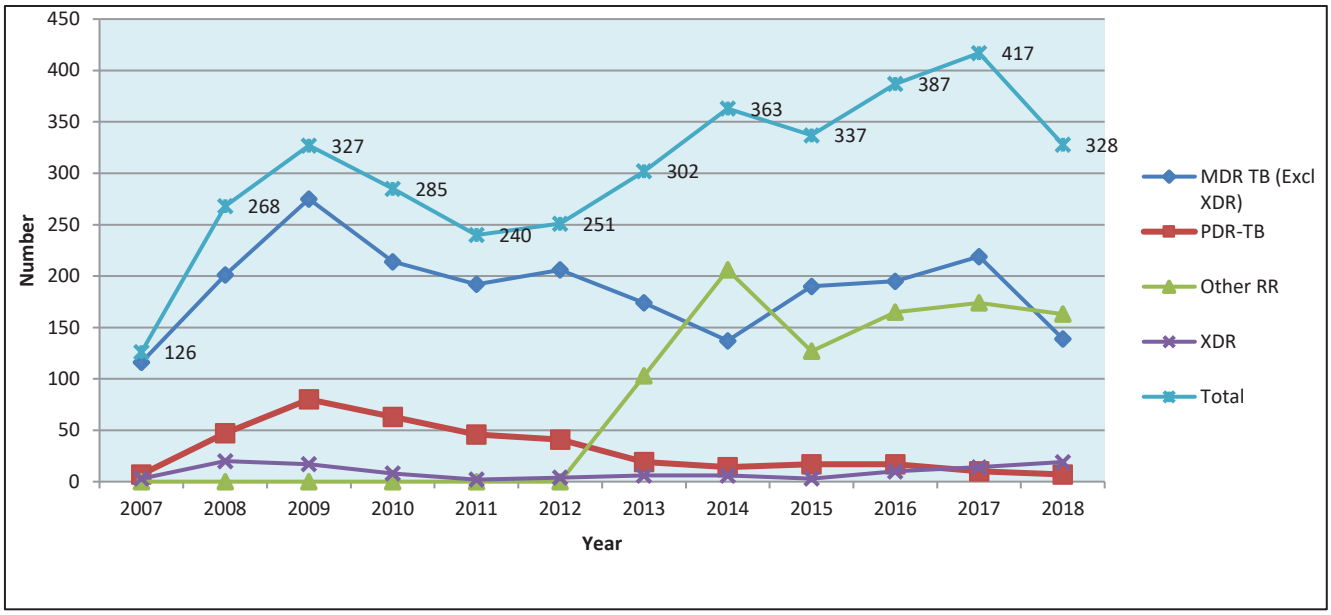
1.3. TB and HIV

TB is a leading killer of people living with HIV (PLHIV). In 2018, 35% of patients notified with TB were infected with HIV. HIV and TB care therefore needs to be integrated especially at service provision level to ensure comprehensive care for HIV infected TB patients. All TB patients should know their HIV status and should receive appropriate HIV care and treatment, including antiretroviral therapy (ART). Conversely all PLHIV should be routinely screened for TB.

1.4. Drug-resistant Tuberculosis

Drug-resistant TB is one of the greatest threats to ending TB in Namibia. The 2015/6 anti-TB drug resistance survey (DRS) showed MDR-TB prevalence of 3.9% and 8.7% among new and previously treated patients respectively. Figure 1 shows the trend in the number of notified cases of drug-resistant TB between 2007 and 2018.

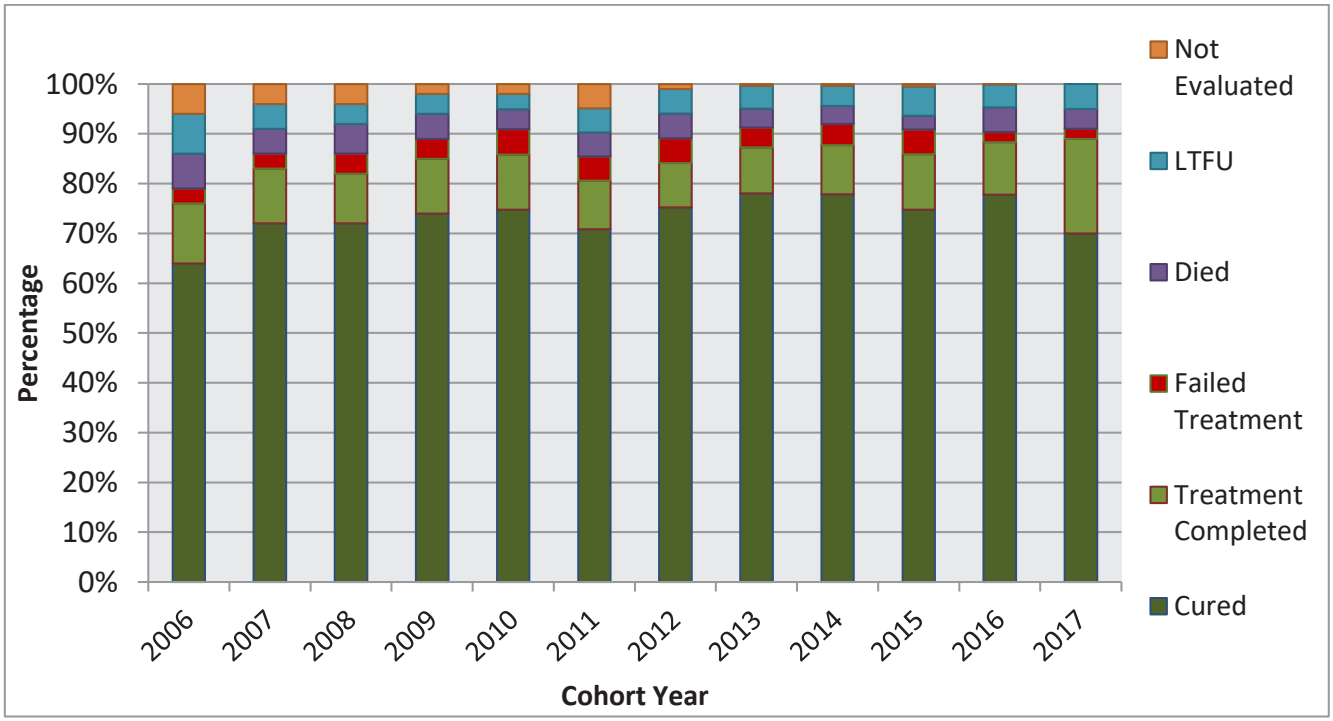
Figure 1: Trends in notified cases of drug-resistant TB in Namibia, 2007-2018



1.5. Treatment outcomes

The global target for treatment success rate is 90%. The treatment success rate for new smear positive cases in Namibia has been on the increase since 2006 and was 88% for the patients commenced on treatment in 2016. There is therefore need to intensify efforts to ensure that the country surpasses the 90% target by minimising unfavourable treatment outcomes such as "loss to follow-up" and "transfer out".

Figure 2: Trends in treatment outcomes for new smear positive cases, 2005-2017 cohorts



2. ORGANISATION AND PROGRAMME MANAGEMENT

2.1. Structure of the National Tuberculosis and Leprosy Programme (NTLP)

NTLP activities are implemented through a decentralised system at national, regional, district and community levels.

2.1.1. National level

The MoHSS through the Directorate of Special Programmes (DSP) is responsible for the overall coordination, implementation, monitoring and evaluation of TB and leprosy care and prevention. The directorate is headed by a Director and its two divisions (Health Sector Response and Expanded National AIDS Response Support) are each headed by a Deputy Director. The Health Sector Response division comprises three sub-divisions: National HIV/AIDS and STI Programme, National Tuberculosis and Leprosy Programme and National Vector-borne Disease Control Programme. Each of these sub-divisions is headed by a Chief Medical Officer (CMO) assisted by a Chief Health Programme Officer (CHPO) and varying numbers of Senior Health Programme Officers (SHPO).

2.1.2. Regional Level

The Regional Management Team (RMT) is responsible for the coordination of TB care and prevention at regional level, and for supporting and overseeing TB care and prevention activities at district level. In each of the fourteen regions a CHPO and SHPO are appointed in the Special Disease Programmes division to provide support to the Regional CMO in the implementation of the major communicable public health diseases. The SHPO assigned to TB and leprosy activities is functionally referred to as the Regional TB and Leprosy Coordinator (RTLC).

Medical doctors are responsible for diagnosis of complicated forms of TB, including bacteriologically negative and extra-pulmonary TB. They should also provide leadership to the clinical team in case management as well as providing technical support to the District TB and Leprosy Coordinator (DTLC). All regions should designate a facility for the management of drug-resistant TB (DR-TB) and other complicated TB cases to ensure coordinated case management as well as adequate capacity building. Since management of DR-TB is very complicated and demanding, these facilities should preferably be staffed with health workers whose main responsibility is the management of these cases.

2.1.3. District level

2.1.3.1. District Coordinating Committee (DCC)

The District Coordinating Committee (DCC) is responsible for overall health planning, coordination, management and implementation in each district, including TB care and prevention activities in both the public and private sector. The coordination and implementation of TB care and prevention activities is overseen by the Senior Medical Officer (SMO) with the support of the Primary Health Care (PHC) Supervisor and the District TB and Leprosy Coordinator.

2.1.3.2. District hospitals

Medical doctors and nurses at district hospitals diagnose, treat and admit TB patients where necessary. These officers should routinely undergo training in management of TB, including TB/HIV co-infection.

2.1.3.3. Health centres and clinics

Health centres and clinics are managed by registered or enrolled nurses and serve as the primary gateway to health care. Doctors from the district hospitals conduct clinics on specific days, and patients with complicated TB should also be reviewed during these clinics. Nurses at this level should receive training on TB since most people with presumptive TB will be identified and managed at this level.

2.1.3.4. Outreach teams

Outreach teams should be capacitated to identify and manage uncomplicated TB. The teams should screen patients who visit the mobile clinic with signs and symptoms of TB. Patients already on treatment should be followed up as appropriate, while those who interrupt treatment or are lost to follow-up should be traced and managed accordingly. Health education should also be given during these outreach visits.

2.1.3.5. School health services

School health teams provide essential health services and should be competent in identification of people with presumptive TB among school children. Children already on treatment can be followed up by the school health team in collaboration with school management. The school health teams are also responsible for health education on TB, among other health conditions, and should sensitise teachers and learners on the importance of early diagnosis and treatment.

2.1.3.6. Environmental health staff

The environmental health officers and assistants as well as health inspectors should be an integral component of the TB programme in every district. They should take the lead in tracing of contacts and patients who are lost to follow-up, as well as in implementation of household and community level infection control measures.

2.1.3.7. Local authorities and regional councils

The regional councils and local authorities have established various structures and activities for HIV that could be very beneficial to TB patients by providing community health education. The inclusion of community-based DOT in existing home-based care programmes will enhance treatment adherence. Advocacy, education and treatment of TB can therefore be delivered by various stakeholders who are RACOC members with an expansion of their terms of reference to include TB activities.

2.1.3.8. Non-governmental Organisations (NGOs)

NGOs complement the role of the MoHSS in providing the continuum of care required for bringing a patient to cure or treatment completion. Their activities mainly focus on providing treatment support, including directly-observed treatment (DOT) as well as providing other supportive measures to facilitate patients' treatment and rehabilitation. The NTLP should however play a central role in the coordination of community-based TB care.

2.1.3.9. Private sector

The private sector offers health services at various levels. Currently the notification of cases of TB by the private sector is variable. There is, therefore need to strengthen public-private collaboration in diagnosis,

treatment and notification of TB based on the NTLP treatment guidelines, as well as to enforce the existing regulations regarding notifiable diseases in the country.

2.1.4. Community level

The community plays an important role in TB care and prevention by identifying and referring symptomatic patients. Community-based organisations, especially home-based care organisations, should play an important role as they care for PLHIV and their families, who are at high risk of developing TB. The expansion of community-based TB care has contributed to the decrease in loss to follow-up rates from 17% in 2000 to 5% in 2016. Critical to this success is the recruitment of community health workers (field promoters) who complement nurses in ensuring a continuum of care from TB diagnosis to cure or treatment completion.
Since a significant proportion of the population seek care from traditional healers, these healers should be engaged to identify and refer patients with TB signs and symptoms, as well as to provide support to TB patients.

2.2. Collaboration and coordination

2.2.1. Coordination within the health sector

The NTLP and the HIV/AIDS and STI Programme acknowledge the necessity to collaborate closely at all levels in providing care to PLHIV and patients with TB, as in many instances the two diseases affect the same patient. The mainstreaming of TB activities in HIV planning and management and that of HIV in TB planning and implementation are reflected in the *National Strategic Framework for HIV and AIDS Response in Namibia 2016/17 – 2021/22 and the Third Medium Term Strategic Plan (MTP-III) for Tuberculosis and Leprosy 2016/17-2021/22, respectively*. The NTLP collaborates closely with NGOs and other sectors already active in HIV prevention, care and support activities in the implementation of TB/HIV activities.

Additionally, the NTLP collaborates with:

- Namibia Institute of Pathology (NIP) in order to ensure well-coordinated, accessible and quality-assured TB laboratory services.
- Division Pharmaceutical Services in the Directorate of Tertiary Health Care and Clinical Support Services to ensure an uninterrupted supply of quality assured anti-TB medicines.

2.2.2. Multi-sectoral collaboration

TB disproportionately affects sectors such as correctional facilities, fishing, farming and mining, among others. These sectors often have crowded living or working conditions which favour the transmission of TB, and productivity may be hampered by long absences from work by those with TB. In order to facilitate the coordination and mainstreaming of TB in the health policy of above-mentioned sectors, terms of reference for TB should whenever possible be added to the existing multi-sectoral coordinating structures in place for HIV.

2.2.3. International collaboration

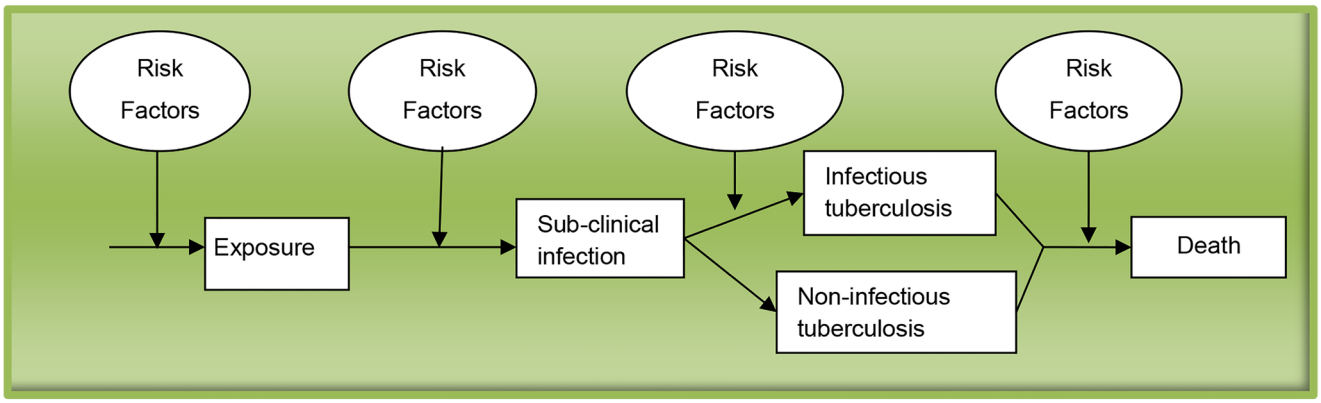
The NTLP collaborates with various international technical and funding agencies including WHO, KNCV Tuberculosis Foundation, USAID, CDC, I-TECH, The Union and Global Fund. The NTLP shall continue to engage these partners and seek new partnerships whenever necessary.

3. PRINCIPLES OF TUBERCULOSIS CARE AND PREVENTION

3.1. Drivers of the TB epidemic

Risk factors for the transmission of TB at population level include poor living and working conditions, and factors that impair the host's immune system, such as HIV infection, malnutrition, smoking, diabetes, alcohol abuse and indoor air pollution. Addressing these factors in their totality is therefore crucial to achieving the goal of ending TB in Namibia. Figure 3 outlines the model of TB epidemiology, taking into account the risk factors at the various stages of the infection-to-disease continuum.

Figure 3: Model for TB epidemiology



The most important risk factors for TB transmission are summarised in **Table 1** below.

Table 1: Main risk factors for the spread and burden of TB

RISKS RELATED TO:	RISK FACTORS
1. Exposure	• Population density • Family size • Climatic conditions • Age of source of infection
2. Sub-clinical infection	• Airborne transmission through infectious droplet nuclei • Characteristics of the infectious patient • Air circulation and ventilation • Reducing expulsion of infectious material from source case • Host immune response • Other modes of transmission: M. bovis
3. TB disease	• HIV infection • Other medical conditions (e.g. diabetes mellitus) • Age • Genetic factors • Environmental factors • Pregnancy • Re-infection
4. Death	• Site of TB • Type of TB • Timeliness of diagnosis • HIV co-infection • Other comorbidities

3.2. The End TB strategy

The 2014 World Health Assembly approved the World Health Organisation's plan to dramatically accelerate the fight against TB, the End TB Strategy, which places patients and communities at the heart of the response. The key targets for the End TB Strategy are to achieve by 2035:

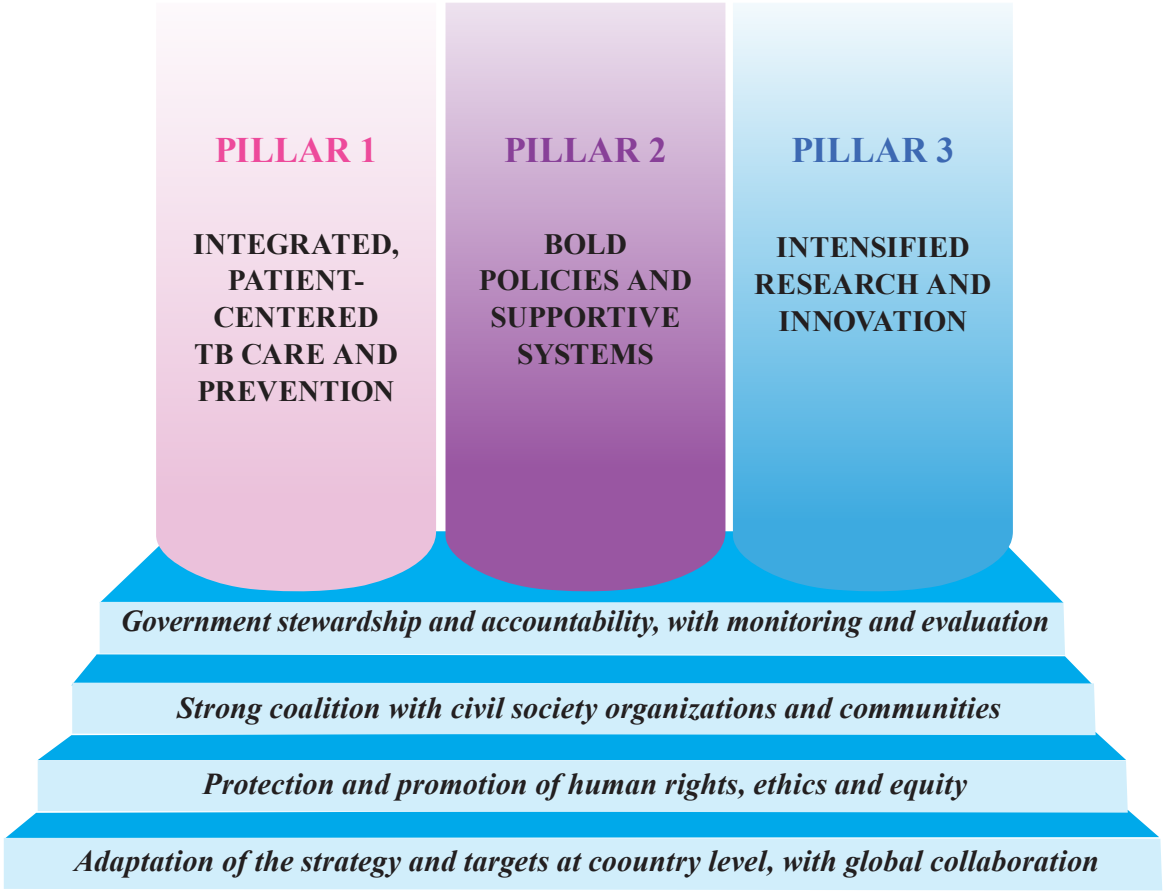
- A 95% reduction in the number of TB deaths relative to the 2015 level,
- A 90% reduction in TB incidence compared to the 2015 level, and
- No TB affected family facing catastrophic costs due to TB.

The End TB Strategy is based on 4 principles and comprises 3 pillars.

3.2.1. Principles

- Government stewardship and accountability, with monitoring and evaluation,
- Strong coalition with civil society organizations and communities,
- Protection and promotion of human rights, ethics and equity, and
- Adaptation of the strategy and targets at country level, with global collaboration.

Figure 4: The END TB Strategy pillars and components



3.2.2. Pillars and components

- **Integrated, patient-centred care and prevention**
  a. Early diagnosis of TB including universal drug-susceptibility testing, and systematic screening of contacts and high-risk groups,
  b. Treatment of all people with TB including drug-resistant TB, and patient support,

c. Collaborative TB/HIV activities, and management of co-morbidities, and
d. Preventive treatment of persons at high risk, and vaccination against TB.

- **Bold policies and supportive systems**
  a. Political commitment with adequate resources for TB care and prevention,
  b. Engagement of communities, civil society organisations, and public and private care providers,
  c. Universal health coverage policy, and regulatory frameworks for case notification, vital registration, quality and rational use of medicines, and infection control, and
  d. Social protection, poverty alleviation and actions on other determinants of TB.

- **Intensified research and innovation**
  a. Discovery, development and rapid uptake of new tools, interventions and strategies, and
  b. Research to optimise implementation and impact, and promote innovations.

3.3. NTLP supportive strategies

The core-strategies of TB care and prevention can only be achieved if supported by the following strategies:

3.3.1. Training

Health workers need to be trained on NTLP technical guidelines. This training should include orientation for newly recruited staff as well as pre- and in-service training.

3.3.2. Patient education and information

Patients who fully understand their disease and its treatment are more likely to complete their treatment. Prior to starting treatment, the health care worker should always take some time and discuss with the patient the diagnosis and treatment.

3.3.3. Supervision

Supervision is a two-way process which aims to improve work performance through joint problem solving and positive reinforcement. Supervision is essential in maintaining quality services and also motivates the workforce. However, it is effective only when those receiving supervision stay long enough in their respective positions to implement the recommendations made during supervision.

3.3.4. Community engagement

Community engagement refers to a process of working collaboratively with and through communities to address issues affecting their well-being. Community based activities are conducted outside the premises of formal health facilities (e.g. hospitals, health centres and clinics) in community-based structures (e.g. schools, DOT points, places of worship, congregate settings and homesteads). A key component of community engagement is advocacy, communication and social mobilisation (ACSM).

Advocacy is the process of ensuring that adequate financial and material resources are available for TB care and prevention; and that TB is accorded its status among the country's priorities. Behaviour change *communication* aims to change knowledge, attitudes and practices among various groups of people. It informs the public of the services that exist for diagnosis and treatment and relays a series of messages about the disease – such as *"get tested for TB if you have a cough for more than two weeks", or "if you are on TB treatment, complete it". Social mobilisation brings together* community members and other stakeholders to strengthen community participation for sustainability and self-reliance. Social mobilisation generates dialogue, negotiation and consensus among a range of players that includes decision-makers, the media, NGOs, opinion leaders, policy-makers, the private sector, professional associations, TB-patient networks and religious groups. Empowering TB patients and the affected communities helps to achieve timely diagnosis and treatment completion, especially among families of TB patients.

3.3.5. Collaboration and networking

Since its determinants are diverse, TB cannot be tackled by the MoHSS alone. The MoHSS structures at all levels must therefore mobilise all sectors and organisations working on health promotion and care in the communities and the workplace.

3.3.6. Operational research

Operational research aims to establish how well a programme is performing and compares the (cost-) effectiveness of different operational approaches. It exploits the benefits of a well-functioning routine recording and reporting system, or can include ad-hoc or complementary data collection for research purposes. Operational research can help the programme to decide on better (more effective or efficient) technical policies to increase the chances of achieving the programme's goals and objectives.

4. DIAGNOSIS OF TUBERCULOSIS

4.1. Introduction

Diagnosis of TB is usually simple when the person has pulmonary tuberculosis (PTB) and sputum is positive either Xpert MTB/RIF or mycobacterial culture. In cases of extra-pulmonary TB and/ or when sputum investigation is negative, more investigations are needed to confirm TB disease. Adherence to anti- TB medications is a heavy burden for the patient and his family in terms of costs, potential side-effects and stigma, hence the need to make an accurate diagnosis to avoid subjecting the patient to unnecessary treatment.

4.2. Mechanism of TB transmission and pathogenesis

In Namibia TB is almost always caused by *Mycobacterium tuberculosis (M.tb)*; infections caused by other mycobacteria are rare. *M.tb* is transmitted from an infectious patient primarily through coughing and is inhaled by the contact *(droplet transmission).* The inhaled bacilli settle in the lung, and cause infection *(primary infection).* In most cases, the bacilli are contained by the body's immune system and remain dormant for the rest of the person's life without any further consequences. The majority of infected people with intact immunity (90-95%) will never develop TB disease. Individuals with compromised immune systems (HIV infection, diabetes, malnutrition, etc) are more likely to develop TB disease at any point in their life.

Pulmonary tuberculosis (PTB) is the most frequent form (80%) of the disease. It is also the most important form in public health due to its infectiousness. Patients with untreated bacteriologically confirmed PTB have high bacillary loads and are highly infectious, while those who present with bacteriologically negative PTB are less infectious. Tuberculosis in young children usually occurs at relatively low bacillary loads, thus young children are generally less infections. Bacteriological confirmation is therefore less common in these children. Adult patients with bacteriologically confirmed PTB are thus the main sources of infection, and curing them is the highest public health priority.

The tubercle bacilli can inhabit any organ of the body including the pleural cavity, lymph nodes, kidney, bladder, bone, meninges, skin, eyes, ovaries as well as skeletal, spinal and gastro-intestinal systems. TB presenting in other organs is mostly non-infectious and is referred to as extra-pulmonary tuberculosis (EPTB). Additionally, TB can be found in more than one organ in the same patient, including a combination of PTB and EPTB.

4.3. Clinical features of TB

TB commonly presents as pulmonary disease. The most common symptoms and signs of TB are:

- Persistent cough for 2 weeks or more
- Haemoptysis (coughing up blood)
- Chest pain
- Night sweats
- Dyspnoea (shortness of breath)
- Loss of appetite
- Loss of weight

TB disease is much more likely in patients with these symptoms and who have a bacteriologically confirmed TB contact. These patients are referred to as 'presumptive TB cases.' The first step to diagnosis is taking a careful medical history when a patient presents with any of the above signs and symptoms. *Table 2:* Important questions in history taking in a presumptive TB case lists some of the important questions that the health worker should ask the patient.

Table 2: Important questions in history taking in a presumptive TB case

SIGN / SYMPTOM	QUESTIONS TO ASK	CONSIDERATIONS
Cough	Howlong haveyou been coughing?	All patients with a productive cough for 2 weeks or more are PTB suspects and must have their sputum examined for TB bacilli.
	Is the cough productive or dry? What is the colour of the sputum?	Both are possible in TB, but usually it is productive. The colour is whitish, unless there is a secondary infection, or there is blood in the sputum.
Profuse sweating mostly at night	Since when have you had this?	Recurrent fever in TB occurs mostly at night, waking the patient up in a state of profuse sweating.
Loss of weight	When did you first notice this?	Usually for some weeks and caused by the general malaise associated with TB disease leading to loss of appetite and increased metabolism.
Swellings in the neck, armpits or groin	How long have you had these?	When caused by TB, swelling of the lymph nodes usually affects the neck, causing asymmetrical, matted, painless and firm lymph nodes, which may have areas of softness or fluctuation.
Blood in the sputum	If coughing, is there blood in the sputum?	This is usually observed by the patient and causes a lot of anxiety.
Chest pain	Does it hurt only when you breathe?	This may point to inflammation of the pleura (pleurisy), lung infarction, or trauma.
	Where is the pain or where else does it hurt?	When it is not well defined, it is usually caused by inflammation and infiltration of the lung.
Shortness of breath	How long have you had this?	If it is a long-standing problem, it might point to asthma, chronic obstructive pulmonary disease, anaemia etc. If it is of shorter duration, it may be caused by lung fibrosis, pleural effusion, pneumothorax, all may be caused by TB or other pathology.
	Does it occur when you exert yourself, climb stairs/hill?	If it is associated with exertion, it might be due to heart failure, or pericardial effusion. The latter is common in TB patients who are HIV positive.
Loss of appetite	When did you first notice this?	Usually for some weeks, and related to the general malaise associated with TB disease.
Tiredness, weakness	When did you first notice this?	Usually long-standing problem, associated with the general malaise of TB disease.

4.4. Investigating for TB

4.4.1. Collecting a sputum specimen

Sputum examination is the mainstay of PTB diagnosis. Whenever PTB is suspected, two sputum specimens should be collected for examination, within 24 hours (see *Box 1*). The healthcare worker attending to the patient should complete the *Request for Bacteriological Examination for TB* form and indicate that it is a 'diagnostic test' that is required. Similar details should be recorded in the *Sputum Examination Register* for monitoring purposes. In the outpatient setting, the patient should be advised to come back to the health facility within a week (ideally not more than 3 days) to get their results. The laboratory should communicate the results to the requesting clinician or health facility as soon as they are ready but this does not take away the responsibility of the HCWs to follow up the results. This is particularly urgent for bacteriologically confirmed results.

Box 1: Sputum collection in the ambulatory patient

Spot specimen

The patient is asked to produce a sputum specimen during the initial consultation; this is referred as a "spot" collection. The patient should be advised to rinse his/her mouth with water to prevent food particles from mixing with the sputum. Specimen collection should be carried out in a well-ventilated place, preferably outdoors. The health care worker should verify that the sample contains sputum and not saliva. The patient is then given a second sputum container to take home for collection of the early morning specimen. In exceptional cases where a second specimen cannot be obtained the next morning, two specimens (spot-spot) can be collected same day.

Early morning specimen

Immediately on waking up, the patient should cough up a specimen of sputum into the container and take it to the health facility. This is usually the specimen with the highest yield of TB bacilli. Specimen collection should be carried out in a well-ventilated place, preferably outdoors.

Whenever PTB is suspected in an in-patient, sputum must be collected using the same spot-morning system as described above. The earlier the diagnosis is made the better the outcome for the patient and the lower the risk of transmission of TB in the health facility.

Box 2: The role of the health care worker in obtaining a good sputum specimen

Instructing the patient well is the basis for a good quality sputum specimen and sputum examination result.

It is very important that health care workers instruct the patient on how to produce a deep cough for the purpose of getting real sputum from the lungs. Health care workers should verify that the specimen produced is sputum and not saliva. Ideally health care workers should observe patients producing the sputum specimen, while keeping sufficient distance when the patient coughs. If all has been done to get the best possible specimen, this specimen should be sent to the laboratory. The laboratory should process all sputum samples received and should not discard any sputum specimen even when they think it is mostly saliva.

4.4.2. Laboratory diagnostic tests

4.4.2.1. Xpert MTB/RIF

Developed in 2009, the Xpert MTB/RIF is considered an important breakthrough in TB diagnostics. It was the first molecular test that is simple and robust enough to be introduced outside sophisticated laboratory settings. Xpert MTB/RIF detects M.tb as well as rifampicin resistance-conferring mutations with a high degree of specificity. The assay provides results directly from sputum in less than two hours.

Xpert MTB/RIF should be the first diagnostic test for all presumptive cases. The laboratory will automatically perform this test if the specimen is sent for 'diagnostic' testing This test is not recommended for monitoring response to TB treatment.

The following results may be reported after performing Xpert MTB/RIF:

- ***M.tb* not detected,** which should be interpreted as a negative result
- ***M.tb* detected with no rifampicin resistance** (rifampicin sensitive), which should be interpreted as rifampicin-susceptible or drug susceptible TB
- ***M.tb* detected with rifampicin resistance,** which should be interpreted as rifampicin resistant TB
- ***M.tb* detected with indeterminate rifampicin resistance,** which is a positive result but with no conclusion on rifampicin resistance. In such cases, another specimen (2nd specimen) should be tested again with Xpert MTB/RIF.
- **Insufficient specimen, error or invalid,** meaning a successful test could not be performed on the submitted specimen, so a new specimen should be tested.

It should be noted that Xpert MTB/RIF does not detect isoniazid resistance. Furthermore, this test does not detect mycobacteria other than tuberculosis (MOTT) and will be negative in such cases even when smear microscopy is heavily positive.

4.4.2.2. Sputum smear examination

Direct (smear) microscopy is less expensive, quick, and highly specific and provides reliable evidence of mycobacteria in the lungs. Sputum smear microscopy is important largely for treatment monitoring and for providing an indication of the degree of infectiousness of TB patients.

Sputum smear results are reported by the presence of stained bacilli (by Ziehl Neelsen or Auramine staining methods) observed.

- **Positive smear results:** A patient with at least one acid fast bacillus (AFB+) in at least one sputum specimen is considered smear-positive TB.
- **Negative smear results:** A patient with two negative sputum-smear results may not have PTB, or the patient may have smear negative PTB, or EPTB.

4.4.2.3. Line-probe assay (LPA)

LPAs detect resistance-conferring mutations in the DNA of the mycobacteria. LPAs are, however, complex to perform and require skilled and well-trained laboratory personnel, as well as specialised laboratory space and design to reduce the risk of false-positive results.

Indications for performing LPA in Namibia are:

- **2nd line LPA as a follow-on test for rifampicin resistance:** When Xpert MTB/RIF detects

rifampicin resistance, the laboratory should forward the 2nd specimen for 2nd line LPA on direct sputum for screening resistance to fluoroquinolone (*gyrA* and *gyrB* mutations) and 2nd line injectables (*rrs* and *eis* mutations)

- **1st line LPA to confirm resistance to isoniazid (and rifampicin):** This is for follow-up specimens when there is need to establish susceptibility to isoniazid or where there is discordance between the rifampicin susceptibility reported by Xpert MTB/RIF and that by phenotypic methods.
- **LPA to detect MOTT:** This is useful when smear is positive but Xpert MTB/RIF is negative, or to identify the species when culture grows MOTT.

4.4.2.4. Diagnostic mycobacterial culture

Culture is the most sensitive diagnostic test for TB. Only 10 bacilli /ml are needed to get a positive growth. Indications for diagnostic mycobacterial culture are:

- Detection of TB in extrapulmonary specimens that are Xpert MTB/RIF negative, and
- Detection of TB in pulmonary or gastric aspirate specimens from children under the age of 5 years.
- Culture is also performed as part of phenotypic drug susceptibility testing (DST) for patients with rifampicin resistance by Xpert MTB/RIF to determine susceptibility to other drugs.

4.4.2.5. TB lateral flow (LF) urine lipo-arabinomanan (LAM) antigen test

The LF-LAM test is designed for use in urine samples as a point-of-care (bedside) test requiring minimal infrastructure or biosafety requirements. This test is only applicable in patients who have tested negative with a bacteriological method, particularly Xpert MTB/RIF and is not to replace bacteriological methods. The test **may be used** to assist in the diagnosis of TB **in HIV positive** adult *in-patients* with signs and symptoms of TB (pulmonary and/or extrapulmonary) and

- Who have a CD4 cell count of 100 cells/µl or less, or
- Who are seriously ill regardless of CD4 count. Seriously ill adults may have any of the following danger signs:
    - Respiratory rate more than 30 breaths/minute
    - Temperature more than 39oC
    - Heart rate greater than 120/minute
    - Unable to walk

A positive LF-LAM test must be interpreted as signifying active TB disease, but a negative LF-LAM should not be used to rule out diagnosis of TB or eliminate the need for further diagnostic tests for TB such as Xpert MTB/RIF or culture. These latter tests exceed the LF-LAM test in diagnostic accuracy and also provide information on drug susceptibility.

4.4.3. Chest X-ray examination

Chest radiography is <u>*not*</u> a substitute for bacteriological examination. Under normal circumstances, diagnostic chest X-ray examination for TB should be considered when sputum examination with Xpert MTB/RIF is found negative or in emergency situations where sputum cannot be produced. Chest radiography may not add value in making a diagnosis of PTB when sputum examination is already positive. Routine chest X-ray examination in presumptive cases is therefore not indicated.

Chest radiography in combination with other clinical evidence is supportive for making a diagnosis of TB but one must be aware that many conditions can show TB-like changes on X-ray pictures. HIV positive patients who have TB may have normal chest radiographs, thus a normal chest radiograph cannot reliably exclude TB in these patients.

However, a chest X-ray is considered to be more sensitive than sputum examination, therefore can be of value in screening certain populations for TB. When used for screening, chest X-ray must be followed by a bacteriological examination, as chest radiography is less specific than bacteriological tests.

Chest radiography for presumptive TB cases should only be performed under the following conditions:

- A patient with at a negative sputum Xpert MTB/RIF result who does not improve on broad-spectrum antibiotics,
- The condition of the patient does not allow waiting for sputum examination results (sputum examination must still be performed in these patients regardless of the X-ray result),
- Breathless patients, irrespective of sputum results (possible pneumothorax, pleural effusion, atelectasis, etc) to facilitate emergency intervention,
- A patient with frequent or severe haemoptysis in order to exclude malignancy or bronchiectasis,
- A patient with a history of working in mines (silicosis) or other occupational exposure to pulmonary irritants (poultry or ostrich farms, textile factory),
- A patient in whom significant pathology other than TB is suspected (e.g. CCF, Kaposi sarcoma), or
- As indicated in the management of patients with drug-resistant tuberculosis (DR-TB).

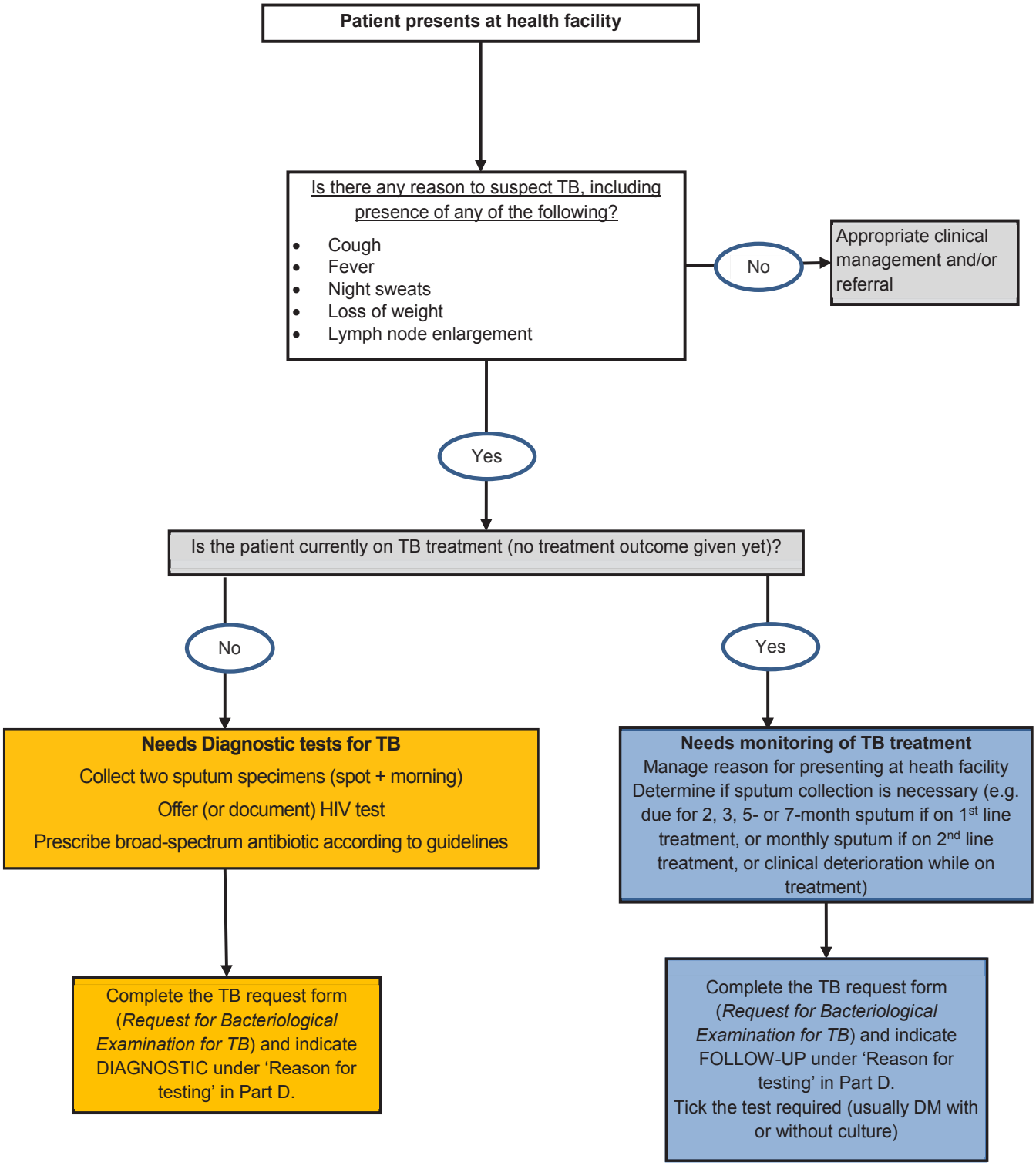
Box 3: Importance of chest x-ray examination

Chest radiography only provides supportive evidence in the diagnosis of TB

An abnormal chest radiograph is not proof of presence or absence of TB disease, particularly in a patient who has had PTB before.

The abnormalities on chest radiographs may be caused by many other diseases and/or manifestations of a previous episode of TB.

Figure 5: Diagnostic flow chart for pulmonary TB2



While typically, a cough of 2-week duration should trigger investigations for TB, in a known or suspected PLHIV cough of any duration should be investigated for TB.

4.5. Diagnosing TB in the context of HIV/AIDS

Information on the HIV status including antiretroviral therapy (ART) and CD4 count is important to make a more accurate and faster diagnosis of TB. Other benefits are that the patient would benefit from ART, cotrimoxazole preventive therapy (CPT), general care and support for HIV related conditions.

4.5.1. 'Diagnostic' HIV testing

Sputum examination remains the primary investigation for the diagnosis of TB. The approach to diagnosis in PLHIV is the same in all patients, but more complicated in a patient who is severely immunocompromised. It is thus recommended to perform an HIV test as part of the diagnostic work-up of the patient. This approach to HIV testing is called "diagnostic" HIV testing. Pre- and post-test counselling must be provided for the patient or his/her family (if the patient is very ill).

4.5.1. Presentation of TB in PLHIV

TB is common in PLHIV, but the diagnosis can be challenging. The HIV-infected TB patient whose immune system is relatively intact may present in the same manner as TB in the HIV-negative patient, with typical features such as cavitary or upper lobe pulmonary disease, positive sputum smear microscopy, etc. However, the HIV-infected TB patient with advanced immunodeficiency is more likely to present with sputum-smear negative pulmonary disease and disseminated TB (blood borne, extra-pulmonary), making a firm diagnosis (with positive sputum smear or culture) more difficult.

Table 3: Features of TB disease in PLHIV

FEATURES OF TB	EARLY HIV INFECTION	LATE HIV INFECTION
PTB	Often resembles post primary (adult) PTB	Often resembles primary (childhood) PTB
Sputum smear results	Often positive	Often negative
Xpert MTB/RIF results	Likely to be positive (higher sensitivity than smear)	May be positive (higher sensitivity than smear)
Chest X-ray examination	Cavities and/or upper lobe infiltration	Infiltrates with no cavities May affect any part of the lung Pleural or pericardial effusion with or without mediastinal glands
Tuberculin test	Often positive	Often negative
TB lymphadenitis	Less common	More common
Miliary TB	Less common	More common
TB meningitis	Less common	More common

4.5.3. Chest radiography in HIV positive patients

The radiographic appearance of TB in HIV positive patients is related to the degree of immunocompetence. During the early stages of HIV disease and in patients doing well on antiretroviral therapy the chest radiographs are more likely to show typical upper lobe cavitation. The appearance becomes increasingly more atypical with advancing immune suppression. In most HIV-infected patients with pulmonary disease, non-specific infiltrates are present, which may or may not be TB.

4.6. Mycobacteria other-than M.tb (MOTT)

Cases of MOTT have been reported in Namibia (see also Chapter 14). As in other parts of the world where MOTT have been reported, it is associated with the increasing HIV epidemics but the clinical relevance of MOTT in immunocompetent persons is often unclear. Typical anti-TB medicines are often not effective in treating MOTT. The treatment of MOTT requires specific antibiotic combinations depending on the type of mycobacterium identified and the clinical syndrome. On identifying MOTT, the laboratory should routinely specify those of clinical importance (*Mycobacterium Avium* Complex (MAC), *Mycobacterium kansasii,* etc). Smear microscopy and culture is often positive, but Xpert MTB/RIF is negative. Two positive specimens are required to make a diagnosis.

4.7. Bacteriologically negative PTB

Bacteriologically negative PTB is a diagnosis that should only be made after Xpert MTB/RIF report shows a negative result. Diagnosis of bacteriologically negative PTB is then made after carefully eliminating other pulmonary diseases that may present in the same way. This is even more important in patients who are HIV positive as they often suffer from other infections at the same time, which may mimic TB.

4.7.1. Criteria for the diagnosis of bacteriologically negative PTB

Diagnosis of bacteriologically-*negative PTB* can be made if a patient has symptoms suggestive of PTB and the clinician has decided to treat with a full course of anti-TB therapy, and the patient:

- has at least one sputum specimen that is Xpert MTB/RIF or culture-negative for *M.tb,* or
- has at least two sputum smears that are negative (in the absence of culture and Xpert MTB/RIF).

Such cases are also classified as 'clinically diagnosed TB,' but are distinct from those in whom a bacteriological test was not performed.

4.7.1. Differential diagnosis of bacteriologically negative PTB

In any patient with negative Xpert MTB/RIF or cultures, the diagnosis can only be made by a clinician after careful consideration of other diseases. Often in bacteriologically negative PTB, the diagnosis is missed in life but made only at autopsy. *Table 4* lists the common diseases that should be considered and excluded before a diagnosis of bacteriologically-negative PTB is made.

Table 4: Diseases that can present like bacteriologically negative PTB

DISEASE	DESCRIPTION
Pneumonia	• Rapid onset of symptoms. Chest X-ray examination shows localised opacity without cavitation as seen in PTB, especially so if they are in the upper part of the lung. A raised white blood cell count is in favour of bacterial pneumonia. A rapid fall of temperature after a course of antibiotics makes the diagnosis likely to be pneumonia. • Pneumonia is common in the immunocompromised patient. The common causative organism in adults is Streptococcus pneumonia which responds well to penicillin/ ampicillin or co-trimoxazole. • Pneumonia due to Pneumocystis jirovecii (PCP) (previously called Pneumocystis carinii) is a common complication of advanced HIV infection. Patients present • with dry cough and severe dyspnoea, whereas PTB disease generally presents with dry cough and severe dyspnoea, whereas PTB disease generally presents

DISEASE	DESCRIPTION
Pneumonia	with a productive cough. Chest radiograph features are often normal or show a bilateral diffuse interstitial shadowing. Definitive diagnosis of PCP depends on finding the microscopic cysts in the sputum. The condition progresses rapidly and can be fatal. It is best to start treatment with high dose cotrimoxazole. PCP can be prevented with cotrimoxazole preventive therapy (CPT).
Pulmonary Kaposi Sarcoma	• Occurring almost exclusively in immunocompromised patients, chest X-ray examination shows nodular or diffuse infiltrates that might be confused with TB. Kaposi sarcoma presents with purple nodules or patches on the skin and mucous membranes. ART is the most effective treatment.
Lung cancer	• The tumour may sometimes break down into a cavity which can be seen on the chest radiograph. An infection beyond a bronchus blocked by a tumour may cause a lung abscess with a cavity. If the sputum is negative diagnosis is often made on bronchoscopy. A solid rounded tumour may be difficult to distinguish radiologically from a rounded tuberculous lesion. A patient with lung cancer is almost always a smoker. Palpate for an enlarged lymph node behind the inner end of the clavicle, a common place for a secondary tumour.
Lung abscess	• Presents with a lot of purulent foul-smelling sputum. The patient usually has a high fever and is very ill. If the purulent sputum is repeatedly negative for TB, a lung abscess is more likely. The white blood cell count is usually high.
Bronchiectasis	• Also presents with copious purulent sputum. Bronchiectasis often develops over a long time due to recurrent bronchitis and other chest infections, including previous PTB. Persistent moist, coarse 'crackles' may be repeatedly heard over the same area of the lung.
Asthma	• Wheeze is not common in TB but it may occur occasionally due to: – enlarged lymph nodes, which may obstruct a bronchus or even the trachea – tuberculous bronchitis. Either of these may cause a localised wheeze. Remember patients with severe asthma may be on long-term corticosteroid medicines (e.g. prednisolone) which may weaken the patient's defences against TB. They can then develop TB as well as asthma. Asthmatic patients who are on treatment and who develop a cough, fever or lose weight should have their sputum examined for TB.

4.8. Management of the severely ill presumptive TB patient

All presumptive TB patients who are severely ill should be admitted in hospital. The clinician should start appropriate intra-venous antibiotic treatment. Meanwhile, efforts must be made to obtain sputum for examination, if not yet done. Label the specimen as **'urgent'** and request the laboratory to process and provide the report on ***the same day.***

When the Xpert MTB/RIF is negative, and the patient improves on the prescribed antibiotics, it may be assumed that the patient has a lung infection not caused by *M.tb.* When the Xpert MTB/RIF is negative and the patient does not improve on antibiotic treatment, a chest X-ray may be useful to provide supportive evidence for PTB. The clinician should take into consideration the HIV status of the patient. If the patient is HIV positive and severely immunosuppressed, TB is likely, an LF-LAM should be attempted. The clinician may make the diagnosis of clinically diagnosed TB and initiate TB treatment. If the sputum Xpert MTB/RIF is positive, the diagnosis of bacteriologically confirmed PTB is made.

4.8.1. "Trial" therapy for TB

There is no role for trial therapy in the management of TB. A proper diagnosis must be made before starting treatment.

4.8.2. Bronchoscopy

This is a useful method to make a diagnosis of PTB or other diseases. Direct observation of the interior of the lung with the bronchoscope can show typical Kaposi sarcoma, bronchogenic carcinoma and TB lesions. Biopsies taken on bronchoscopy can help to differentiate between TB and other diseases. This method is done under local anaesthesia and is reported to be 92% effective in obtaining positive bacteriology in patients with PTB, if combined with bronchio-alveolar lavage. Bronchoscopy is not a routine TB diagnostic tool in Namibia but is very important investigation at the referral.

4.8.3. Tuberculin skin test

The tuberculin skin test (TST) is only helpful in diagnosing TB infection in a person who is immunocompetent, and has very limited value in the clinical diagnosis of TB disease since a positive or negative result does not prove or disprove that a person has TB disease. The TST test is mostly recommended for determining TB infection in an otherwise healthy person, mostly a child who has been recently exposed to a patient with TB disease.

The Mantoux test is the TST used Namibia; Box below summarises how it is performed and interpreted.

Box 6: How to perform and interpret the Mantoux test

The Mantoux test is applied as follows: Using a short fine needle and special syringe calibrated for contents of 0.1ml portions, 0.1ml is drawn from a vial with Purified Protein Derivate (PPD) and - after proper disinfection of the skin - injected intradermally on the inner side of the lower left arm, at the junction of the upper and middle third. After 48-72 hours the skin is examined for induration at the injection site. The diameter of the induration is measured at its largest diameter. The outer edge of the induration is best determined using a ballpoint. Draw the ballpoint inwards towards the induration; where it meets resistance draw a short line oblique to the radial line; do the same on the opposite side; measure the distance between the two oblique lines in millimetres; this is the exact distance of induration.

Mantoux test results and interpretation

	Negative	**Positive**
HIV-	0-9mm induration	10mm or more
HIV+	0-4mm induration	4mm or more

A positive test is proof of infection with *M.tb*. It is never proof of active TB. Only positive bacteriology is firm proof of TB. A positive tuberculin test result can support a diagnosis of TB in the presence of other clinical evidence of TB.

A false positive result is rare in the tuberculin skin test once there is agreement on the criterion for a positive result. Infection with Mycobacteria Other Than Tuberculosis (MOTT) can also cause an induration, but usually not as strong as an infection by *M.tb*. It is for that reason that the criterion for a tuberculin test being positive is the size of the induration.

Boosting phenomenon

The boosting phenomenon may occur when two successive tuberculin tests are applied within months to a person who has had BCG long before or who has had a latent TB infection in the past. With the first tuberculin test being negative, the second test may be positive, which may be erroneously interpreted as a recent tuberculin test conversion, or recent *M.tb* infection. This is erroneous because the second increased induration is only the result of a boosting of pre- existing cellular immunity caused by the first of the two tuberculin injections. Physicians who use the tuberculin test for monitoring recent infection in health care settings should be particularly aware of this phenomenon. In persons with a negative result, it may be useful to repeat a second tuberculin test after 2-4 weeks to ensure that there has not been a previous infection (or a BCG vaccination in the past).

A negative test result indicates – but is not firm proof - that the person is not infected by mycobacteria. There are many reasons why the result might be false negative. These include:

- Incorrect test application (subcutaneous injection instead of intradermal); inactive tuberculin,
- The patient is severely immune suppressed. This happens in patients with advanced AIDS (and low CD4 counts); very cachectic patients; severely malnourished children.

Effects of previous BCG vaccination

BCG vaccination is given to all new-borns in Namibia. The tuberculin test will become mildly positive after BCG vaccination. *M.tb* infection will create a much stronger reaction than BCG. Similarly, environmental mycobacteria are very common in Namibia and also create a positive tuberculin test result. Usually the induration is well below 10mm. That is the reason for deciding on 10mm or more as the cut-off point for infection by *M.tb*.

4.9. Diagnosis od extra-pulmonary tuberculosis

Extra-pulmonary tuberculosis (EPTB) is much less common than PTB, except in patients with advanced HIV infection where it may be more frequent. It may have many different manifestations depending on the organ that is affected. The initial infection would probably be in the lungs; TB bacilli may then spread via the blood stream and the lymph nodes to various parts of the body. Sometimes TB bacilli directly enter organs other than through the lungs.

4.9.1. Medical history

The same general signs and symptoms as for PTB will occur in EPTB, such as tiredness, loss of appetite, weight loss, and night sweats. Presence or absence of these signs and symptoms should always be elicited from the patient. Specific complaints such as pain and swelling are caused by

inflammation of the affected organ. Many patients with EPTB may also have concomitant PTB, because the lungs are the most common port of entry of the TB infection. Patients should therefore be questioned about signs and symptoms of PTB and have sputum examination performed.

Figure 6: Diagnostic flow-chart for lymph node enlargement

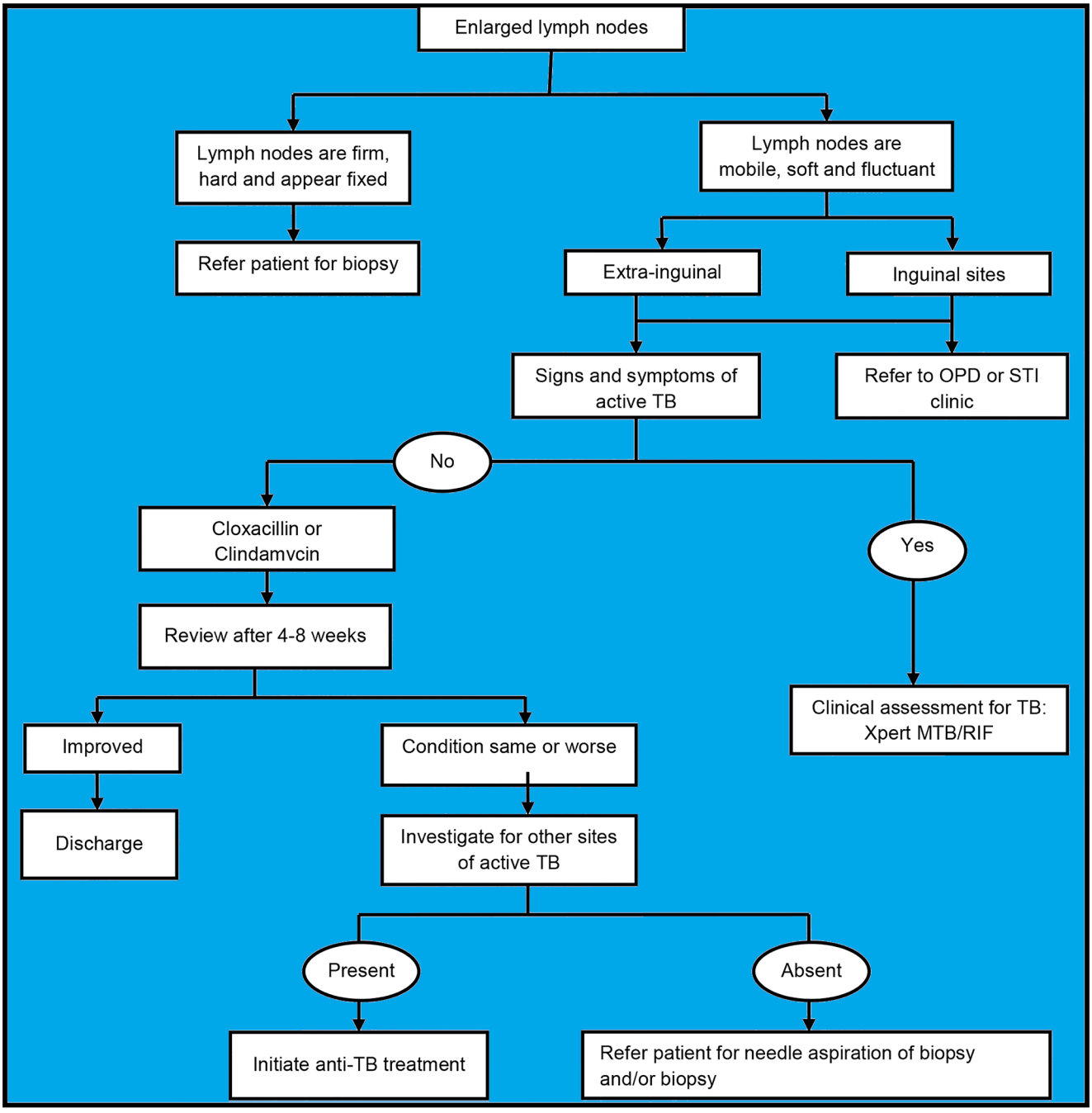
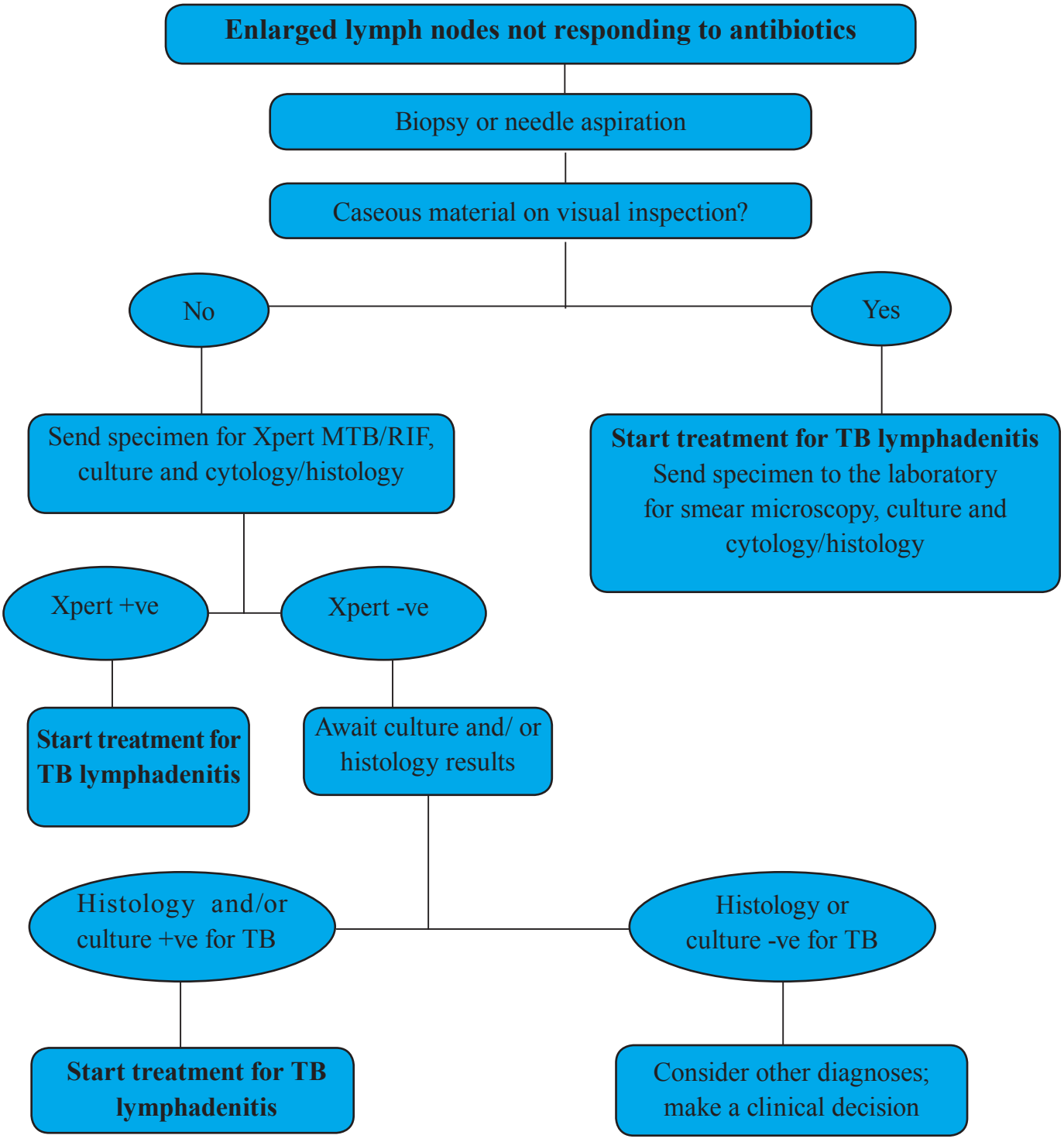


Figure 7: Diagnostic flow-chart for TB lymphadenitis with needle aspiration or biopsy



4.9.1.1. Fine needle aspiration

Needle aspiration is mostly used in diagnosing lymph node TB. A needle is inserted into the centre of the swollen lymph node, and material is aspirated into the needle. All specimens should be sent for Xpert MTB/RIF and follow-on mycobacterial culture (if negative). In addition, the specimen is sent for cytology or histology if there is no obvious evidence of caseation. However, if caseous material is seen, the patient should be commenced on anti-TB treatment while awaiting the laboratory results.

4.9.1.2. Tissue biopsy

A biopsy from the affected organ can be obtained during a surgical procedure on patients undergoing investigation or excision of a diseased organ. The final diagnosis should be made on histology.

4.9.1.3. Pleural and peritoneal fluid aspiration

Between 97 and 99% of all pleural effusions in areas where HIV prevalence is high are caused by TB. In TB pleurisy, an exudate accumulates in the pleural cavity. Simple aspiration of pleural fluid is enough to exclude causes other than TB. The aspirate forms a web when left standing and shows a high protein content on analysis. The gram stain is negative. Examination yields smear-positive results in less than 10% of cases. Ascites due to TB in the peritoneum also presents as an exudate.

4.9.1.4. Cerebro-spinal fluid (CSF)

A lumbar puncture should be performed when TB meningitis is suspected in a patient. The CSF obtained should be submitted for Xpert MTB/RIF and follow-on mycobacterial culture as well as routine microscopy (including India ink and gram staining), bacterial culture and biochemistry. If the gram stain and testing for Cryptococcus are negative, TB meningitis should be considered, even when Xpert MTB/RIF is negative.

4.9.1.5. Urine

When TB of the renal and urinary system is suspected, mycobacterial culture examination of three morning urine specimens can confirm the diagnosis.

4.9.1.6. Genital fluids

When genital TB is suspected, menstrual fluid or material obtained from dilatation and curettage should be examined for AFB and mycobacterial culture should be performed. Smear examination for AFBs as well as mycobacterial culture should be performed on ascitic fluid obtained at laparotomy in patients with suspected adnexal TB

4.9.1.7. Differential diagnosis of extra-pulmonary tuberculosis

The following table summarises the different clinical features and differential diagnoses for the many different manifestations of EPTB. The most common EPTB manifestations after lymphadenitis are: pleurisy, peritonitis (or other forms of gastrointestinal TB), meningitis, spondylo-discitis (spinal TB), arthritis, uro-genital TB, and pericarditis.

Table 5: Clinical features and differential diagnoses for extra-pulmonary tuberculosis

Type of EPTB	Clinical Features	Diagnosis	Differential Diagnosis
Lymph-adenopathy	• General features of TB disease usually mild • Mildly tender • Common in cervical nodes • Matted together • Often causes chronic fistulas	• Needle aspiration • Lymph node biopsy (caseation-cheesy material seen on visual inspection)	• Persistent Generalised Lymphadenopathy (PGL) in HIV+ patient • Carcinoma, • Sarcoidosis, • Pyogenic abscess
Miliary TB	• Very sick patient • Fever • Weight loss • Hepato-splenomegaly • Tubercles in the choroid of the eye	• Chest X-ray examination: diffuse, uniformly distributed small miliary shadows • Pancytopenia, • Bacilli in CSF • Biopsy of bone marrow or liver shows TB granulations	• HIV wasting syndrome (if active TB can be excluded) • Septicaemia • Disseminated carcinoma
Pleural effusion	• Chest pain • Breathlessness • Mediastinal shift on X-ray • Decreased breath sounds • Stony dullness on percussion of chest	• Chest X-ray examination: unilateral uniform white opacity often with concave upper border • Aspiration of straw coloured fluid • Pleural biopsy (not routinely done except for suspected malignancy) • Pleural fluid chemistry for protein and LDH	• Malignancy • Post pneumonia effusion • Pulmonary embolism
TB pericarditis (mostly presenting as pericardial effusion)	• Cardiovascular features • Pericardial friction rub	• Chest X-ray examination: a large globular heart • ECG (ST and T wave changes) • Cardiac sonar (echocardiography)	• Cardiomyopathy • Any cause of heart failure
Abdominal TB (peritoneum or intestines)	• Ascites • Weight loss • Abdominal mass • Intestinal obstruction	• Chest X-ray examination (to exclude PTB) • Abdominal tap (ascitic fluid chemistry) • Abdominal ultrasound • Peritoneal biopsy • Abdominal X-ray examination (including barium studies in suspected malignancy) • Cytology/Histology	• Malignancy • Liver disease
TB meningitis	• Irritability/confusion • Fever • Weight loss • Headache • Decreasing consciousness • Fits • Neck stiffness	• CSF (microscopic and chemical examination)	• Viral or bacterial meningitis • Cryptococcal meningitis
TB spine	• Back pain • Psoas abscess • Spinal cord compression with paresis or paralysis	• X-ray examination of spine • MRI • Tissue biopsy	• Secondary malignancy
TB bone	• Chronic osteomyelitis • Fistula	• X-ray examination • Biopsy • Culture	• Malignancy • Other bacterial infection
Hepatic TB	• Hepatomegaly	• Ultrasound scan • Liver biopsy	• Hepatoma • Amoebic abscess • Hepatitis of any cause

Type of EPTB	Clinical Features	Diagnosis	Differential Diagnosis
Renal TB	• Frequency • Dysuria • Haematuria • Loin pain • Oedema	• Sterile pyuria • 3 early morning urine specimens for mycobacterial culture • IV pyelogram	• Bilharzia • Carcinoma • Nephritis
Adrenal glands	• Hypo-adrenalism (Hypotension, raised urea, low serum sodium) • Usually combined with miliary TB • Common in HIV infected patients • High mortality	• Ultrasound scan • X-ray examination (shows calcifications)	• Malignancy
Female genital TB	• Infertility • Pelvic infection • Ectopic pregnancy	• Pelvic examination • X-ray examination of genital tract • Biopsy, urine for mycobacterial culture	• Sexually transmitted diseases (STD) • Malignancy
Male genital tract	• Pain and swelling of epididymis	• Tissue biopsy • X-ray kidney • Urine for mycobacterial culture	• STD • Malignancy
Upper respiratory tract TB	• Hoarseness • Pain in ear • Pain on swallowing	• Laryngoscopy • Oesophagoscopy • ENT referral	• Carcinoma of vocal cords • Carcinoma of oesophagus

TB meningitis carries a high mortality and is particularly frequent in small children. The diagnosis is sometimes difficult to differentiate from other diseases. *Table 6* lists the diagnostic approach to the diagnosis of TB meningitis.

Table 6: Differential diagnosis of TB meningitis

Disease	CSF White cells	Protein	Glucose	Microscopy
TB meningitis	Elevated (L>PMN; PMN raised initially)	Increased > 1g/dl	Decreased or markedly decreased	AFB rare, not to be relied on
Cryptococcus meningitis	Elevated L>PMN	Increased	Normal or slightly decreased	Positive India ink staining or cryptococcal antigen test
Partially treated bacterial meningitis	Elevated both PMN and L	Increased	Decreased	Bacteria on Gram stain (rarely)
Viral meningitis	Elevated L>PMN	Increased but less than < 1g/dl	Normal (low in mumps or H. Simplex)	No organisms identified
Secondary syphilis	Elevated L>PMN	Increased	Normal	Dark background microscopy needed to identify AFB
Rare diseases in Namibia				
Late stage Trypanosomiasis (Travel history to Central or West Africa)	Elevated (L>PMN)	Increased	Decreased	Motile trypanosomes
Tumour (carcinoma/lymphoma)	Elevated (L>PMN)	Increased	Decreased	Cytology shows malignant cells
Leptospirosis	Elevated (L>PMN)	Increased	Decreased	Cytology shows spirochetes
Amoebic meningitis	Elevated (L>PMN)	Increased	Decreased	Amoebae

4.10. Haemtological and biochemical examinations in TB patients

Laboratory examinations should only be done when their result will influence the management of the patient. *Table 7* provides information on what is (or is not) useful to examine routinely in a patient newly diagnosed with TB. Some tests are desirable if they can be done at start of treatment while others are indicated when a patient develops complications. Repeat laboratory examinations are only indicated when a patient develops complications. The large majority of TB patients tolerate the first-line TB medicines very well; routine liver function tests in a patient doing well on treatment are not indicated.

Table 7: Other laboratory examinations

Examination	Indication	Remarks
Erythrocyte Sedimentation Rate (ESR)	• None	• ESR will be elevated in any serious disease or infection (high sensitivity) • ESR is too unspecific to disprove TB disease when it is normal (low specificity)
Haemoglobin (Hb)	• Not routinely indicated • Indicated in a clinically anaemic patient	• Can serve as a baseline for treatment of anaemia
Liver Function Tests (LFT)	• Not routinely indicated • Indicated when patient has jaundice, is seriously nauseated or vomiting, or when patient has a history of liver disease	• Can serve as a baseline in case of abnormalities and previous liver disease history • Elevation of liver enzymes up to 3x normal value when on TB medication is acceptable and may not warrant interruption of TB treatment
Urine	• Not routinely indicated • Indicated when the patient has signs and symptoms of higher or lower urinary tract infection (due to TB or other causes) or diabetes	• Urine culture is useful when TB of the urinary tract is suspected
Adenosine Deaminase (ADA)[3]	• TB pleural effusion, only if there is any doubt about the diagnosis	• The levels of adenosine deaminase (ADA), an enzyme found in most cells, are increased in TB pleural effusions

Box 4: Summary of criterion for diagnosis of TB disease in an adult

The following criteria apply before a diagnosis of TB disease is made in a patient with signs and symptoms compatible with TB disease:

- Presence of one positive Xpert MTB/RIF
- Presence of one positive culture for M.tb
- Positive histology
- Positive TB lateral flow LAM test
- Clinical picture and consistent fluid chemistry (pleural fluid etc.)
- Negative sputum bacteriologic results with no improvement on treatment with broad-spectrum antibiotics and a TB compatible chest radiograph

[3] Several reports have suggested that an elevated pleural fluid ADA level predicts tuberculous pleurisy with a sensitivity of 90 to 100% and a specificity of 89 to 100%. Specificity is increased when the lymphocyte/neutrophil ratio in the pleural fluid (of > 0.75) is considered together with an ADA concentration of > 50 U/L

5. MANAGEMENT OF TUBERCULOSIS

5.1. Introduction

Anti-TB chemotherapy is the most important intervention for the control of TB in any population. Chemotherapy kills *Mycobacteria tuberculosis* (MTB) bacilli in an infectious patient, thus stopping transmission in the community. Most patients with bacteriologically positive TB becomes non-infectious within days of commencing effective treatment.

Evidence from good TB programmes shows that high treatment success rates (up to 95%) can be achieved when:

- TB treatment is provided as a package of patient-centred care, often with daily direct observed therapy (DOT) at the patient's convenience, for instance close to the patient's home, at his/her workplace, or at the nearest health facility,
- the patient is well informed about the treatment,
- the patient is supported by relatives, community workers and health staff to complete the treatment as prescribed, and
- health care workers at all levels fully adhere to the national TB treatment guidelines.

5.2. Case definitions and classification

For rational and effective management of patients with TB it is very important that every patient is categorised correctly before chemotherapy is started. Uniform criteria to define a TB case are needed for:

- proper patient registration and case notification,
- selecting appropriate standard treatment regimens,
- standardising the process of data collection for TB care and prevention,
- evaluating the proportion of cases according to site, bacteriology and treatment history,
- cohort analysis of treatment outcomes, and
- accurate monitoring of trends and evaluation of the effectiveness of TB programmes within and across districts, countries and global regions.

A person who presents with symptoms or signs suggestive of TB is referred to as a Presumptive **Tuberculosis case** (previously referred to a 'TB suspect'). The most common symptom of pulmonary TB is a productive cough for two weeks or more, which may be accompanied by other respiratory symptoms (shortness of breath, chest pains, haemoptysis) and/or constitutional symptoms (loss of appetite, weight loss, fever, night sweats, and fatigue).

Diagnosis of a **Case of Tuberculosis** can be either through bacteriological confirmation or clinical findings, after which a health care worker (clinician or other medical practitioner) decides to treat with a full course of anti-TB treatment.

Note: Any person given treatment for TB should be recorded as a case. Incomplete "trial of TB treatment" should not be given as a method for diagnosis.

Cases of TB are classified according to:

- anatomical site of disease
- bacteriological results (including drug resistance)

- history of previous treatment
- HIV status.

5.2.1. Case definition by anatomical site of TB disease

Defining the site is important for recording and reporting purposes and to identify the more infectious patients – those with pulmonary involvement, who will be further subdivided by bacteriological status (see section below).

Pulmonary tuberculosis (PTB) refers to a case of TB (defined above) involving the lung parenchyma. Miliary TB is classified as pulmonary TB because there are lesions in the lungs.

Tuberculous intrathoracic lymphadenopathy (mediastinal and/or hilar) or tuberculous pleural effusion, without radiographic abnormalities in the lung parenchyma, constitute a case of extrapulmonary TB. A patient with both pulmonary and extrapulmonary TB should be classified as a case of pulmonary TB.

Extrapulmonary tuberculosis (EPTB) refers to a case of TB (defined above) involving organs other than the lungs (particularly the lung parenchyma), e.g. pleura, lymph nodes, abdomen, genitourinary tract, skin, joints and bones, meninges. Diagnosis should be based on at least one specimen with confirmed MTB or histological or strong clinical evidence consistent with active EPTB, followed by a decision by a clinician to treat with a full course of anti-TB chemotherapy. The case definition of an EPTB case with several sites affected depends on the site representing the most severe form of disease. A case of EPTB may be bacteriologically confirmed or clinically diagnosed (see below). In general, recommended treatment regimens are similar, irrespective of site.

5.2.2. Case definition by bacteriological status

Bacteriologically confirmed case of TB refers to one from whom a biological specimen is positive by smear microscopy, culture or rapid molecular test such as Xpert MTB/RIF, line probe assays or other PCR- based methods. Bacteriologically confirmed cases can be pulmonary or extra-pulmonary. All such cases should be notified, regardless of whether TB treatment has started. Bacteriologically confirmed cases can be subdivided further into:

- **Rifampicin susceptible** (sensitive) cases; where Xpert MTB/RIF or other test has confirmed MTB but failed to detect resistance.
- **Rifampicin resistant** cases; where a molecular test (such as Xpert) or phenotypic test has detected resistance to rifampicin.

Other classifications of drug resistance are described in Chapter 7.

Clinically diagnosed case of TB refers to one which there is no bacteriological confirmation but has been diagnosed with active TB by a medical practitioner who has decided to give the patient a full course of TB treatment. This definition includes cases in whom specimens taken were bacteriologically negative, or cases diagnosed by radiology (x-rays) or those diagnosed by histopathology where the pathologist has failed to describe presence of TB bacilli. Clinically diagnosed cases can be pulmonary or extrapulmonary. It is necessary to distinguish between clinically diagnosed cases in whom bacteriological confirmation has been attempted on an appropriate specimen and those in whom specimens have not been tested, particularly for pulmonary TB.

Clinically diagnosed cases of pulmonary TB can either be:

- **Bacteriologically negative,** where sputum was Xpert MTB/RIF and/or culture negative yet a clinician decided to treat for TB based radiological, clinical or other evidence. Where only smear microscopy is available, two negative smears may be considered bacteriologically negative.
- **Sputum not tested,** sputum has not been investigated for TB, yet a clinician decided to treat for TB based radiological, clinical or other evidence.

Efforts to collect sputum should be made on every presumptive TB case above the age of 5 years including those with EPTB (a proportion will have an unrecognised pulmonary component). Cases without sputum results should be an exception rather than the rule. In the event that a patient was started on treatment as an emergency without sputum collection, sputum can still be collected when the patient's condition has stabilised.

5.2.3. Case definition by history of previous treatment:

Each patient with TB is further classified according to whether or not they have previously received TB treatment, as well as the outcome of this previous treatment. It is important to identify previously treated patients because they are at increased risk of anti-TB drug resistance.

New TB patients are patients who have never had treatment for TB, or have taken anti-TB medicines for less than one month. New patients may be bacteriologically confirmed or clinically diagnosed and may have disease at any anatomical site.

Previously treated TB patients are patients who have received at least one month of anti-TB medicines in the past. They may be bacteriologically confirmed or clinically diagnosed. They are further classified by the outcome of their most recent course of treatment (**relapse; treatment after failure; treatment after loss to follow-up or unknown last outcome**) as shown in table 8. In addition, table 9 summarises definitions of these subclasses.

Table 8: Registration group by most recent outcome

REGISTRATION GROUP (ANY SITE OF DISEASE)		BACTERIOLOGY	OUTCOME OF MOST RECENT TREATMENT
New		Positive/negative	N/A
Previously treated	*Relapse*	Positive/negative	Cured/completed
			Treatment completed
	Treatment after failure (TAF)	Positive	Failed treatment
	Treatment after loss to follow up TALFU)	Positive/negative	Loss to follow up (LTFU)
	Unknown last outcome	Positive/negative	Unknown (Only the outcome is unknown but it is known that they were treated)
Transfer in (A patient who has been transferred from another reporting unit/TB register to continue treatment)		Positive/negative	Still on treatment
Treatment history unknown		Positive/negative	Not known whether the patient ever received treatment or not

5.2.4. Case definition by HIV status

An **HIV positive TB** patient refers to any bacteriologically confirmed or clinically diagnosed case of TB who has a positive result from HIV testing conducted at the time of TB diagnosis or other documented evidence of a prior positive result or documented enrolment in HIV care.

Determining and recording the TB patient's HIV status is critical for treatment decisions as well as for assessing programme performance. The TB Treatment Card and Facility and District TB Registers include information on HIV testing, co-trimoxazole, and ART. Always encourage clients to get tested for HIV and update the *TB Treatment Card* and TB registers when this has been done.

An **HIV negative TB patient** refers to any bacteriologically confirmed or clinically diagnosed case of TB who has a negative result from HIV testing conducted at the time of TB diagnosis or during TB treatment.

Table 9: Summary of registration categories

Classification	Definition
New	A patient who has never been treated before for TB, or who has taken TB treatment only for less than one month. They may be PTB (bacteriologically confirmed or clinically diagnosed) or EPTB
Previously treated	A patient who has previously received at least a month (4 weeks) of TB treatment, regardless of the previous outcome. They may be PTB (sputum positive or negative) or EPTB; This group includes *relapses, treatment after failure, treatment after lost to follow up (LTFU) and unknown last outcome*
Pulmonary TB	A patient who has TB affecting the lung parenchyma. This includes disseminated or miliary TB and those with concurrent pulmonary and extra- pulmonary involvement
Extra-pulmonary TB	A patient with TB disease involving sites other than the lung parenchyma, without lung involvement
Relapse	A patient previously treated for TB who has been declared cured or treatment completed at the end of their most recent course of treatment and is now diagnosed with an episode of TB
Treatment after *failure*	A patient who is started on TB treatment after they have been treated before and sputum smear or culture was positive at month 5 or later during their previous (most recent) treatment episode.
Treatment after *lost to follow up*	A patient who is started on TB treatment after previous (most recent) treatment was interrupted for 2 consecutive months or more
Transfer in	A patient who has been transferred from another recording and reporting unit or TB register to continue treatment. They can have PTB or EPTB.

5.3. Treatment of Tuberculosis

5.3.1. Standard treatment regimens for defined patient groups

Namibia maintains WHO recommended standardised TB treatment regimens. Standardised treatment means that all patients in a defined group receive the same treatment regimen, and has the following advantages over individualised prescriptions of medicines:

- it minimises errors in prescription, and thus reducing the risk of development of drug resistance
- it simplifies estimation of medicine requirements at all levels
- it reduces costs
- it ensures regular medicine supply when patients move from one area to another
- treatment results can be compared.

For assigning standard regimens, patients are grouped by the same patient registration groups used for recording and reporting, which differentiate new patients from those who have had prior treatment. Recommended regimens for different patient registration groups are shown in *Table 9.* The terminology "new patient regimen" (standard regimen for new TB patients), "retreatment regimen with 1st line medicines" (standard regimen for previously treated patients) has been replaced with **"first line regimen for TB"**, since streptomycin is no longer in use in this particular case, and **"DR-TB** treatment regimens" remains unchanged.

Table 10: First-line anti-TB medicines

Generic name	Abbreviation	Mode of action
Rifampicin	R	Bactericidal
Isoniazid	H	Bactericidal
Pyrazinamide	Z	Bactericidal
Streptomycin	S	Bactericidal
Ethambutol	E	Bacteriostatic

Table 11: Summary of Anti-TB regimens

Regimen	Indication
First line regimen for TB (2HRZE/4HRE)	New TB patients without rifampicin resistance Previously treated TB patients without rifampicin resistance
Standardised shorter DR- TB treatment regimen	Patients with uncomplicated rifampicin resistant TB
Individualised DR-TB regimens	Patients with complicated DR-TB, including resistance to fluoroquinolone and/or second line injectables

Table 12: Recommended regimen for new and previously treated TB patients

First line regimen for TB – 2RHZE/4RHE	
Regimen structure	• Initial phase of 2 months of RHZE daily, followed by continuation phase of 4 months of 4RHE daily (total 6 months)
Patient category	• All new patients with any form of TB that is drug susceptible or presumed to be drug susceptible (after Xpert MTB/RIF testing) • All previously treated patients with any form of TB
Modifications advised on the treatment regimen	• In TB meningitis or TB of the spine, total duration of treatment is 9-12 months, achieved by extending the continuation phase • In TB meningitis, streptomycin may be added for at least 2 months if deemed safe by a medical officer
Laboratory monitoring of treatment & action to be taken	For follow up of **all** new patients, one sputum-smear examination should be performed: • at 6 weeks of treatment, and • after 5 months of treatment (if sputum Xpert or smear was positive at the beginning)
	If follow up sputum smear is positive at 6 weeks or if the patient is not improving clinically, then: • Send new sample for first line-line probe assay (1st line LPA) to check susceptibility to rifampicin and isoniazid and, if MTB is not detected, possible MOTT species identification • Continue the initial phase until the result of the 1st line LPA • The patient must be reassessed by a doctor If 1st line LPA shows MTB with rifampicin resistance with or without isoniazid resistance: • Stop the treatment, and register the patient in the DR-TB register • Send one sputum specimen for culture and DST • Evaluate and prepare for treatment with a DR-TB regimen (see Chapter 7) If 1st line LPA shows MTB with rifampicin susceptibility with i**soniazid resistance:** • This is **isoniazid resistant** TB (Hr-TB). Amend the registration category as isoniazid resistant TB. • Request the laboratory to conduct 2nd line LPA • Continue intensive phase until the results of 2nd line LPA are available If 2nd line LPA shows susceptibility to fluoroquinolones • Add levofloxacin to the regimen • Continue with HRZE for a further 6 months as 6HRZELfx3

Laboratory monitoring of treatment & action to be taken	If 2nd line LPA shows resistance to fluoroquinolone • Continue the HRZE for 6 more months. Do not add any other medicine[4]. • This also applies for other patients in whom a fluoroquinolone is contra-indicated
	If sputum is **smear positive after 5 months** of treatment: • Establish if this is true medicine failure (i.e. patient was on DOT and still failed) • Send one sputum for C/DST • Discharge from treatment as "failed" • Re-evaluate as a diagnostic case with Xpert MTB/RIF and a chest X-ray • If failure is due to patient not taking medicines, consider re-initiating the first line regimen.
Chest X-ray examination	There is no indication for routine X-ray examination for routine monitoring clinical progress in patients on *first line* anti-TB therapy. An X-ray should be performed at baseline in all clinically diagnosed cases and all cases who are smear positive at 5 months.
End of treatment	In bacteriologically confirmed TB patients, if sputum smears are negative at 2 months and after 5 months, and the patient has taken 6 months of treatment: discharge patient and record as ***"cured"*** In clinically diagnosed TB patients; bacteriologically confirmed PTB patients unable to produce sputum at the end of treatment, and bacteriologically confirmed EPTB patients who have taken treatment for 6 months: discharge patient and record as ***"treatment completed"***

5.3.2. Treatment dosages by weight categories

5.2.3.1. Fixed dose combinations

The WHO continues to recommend the use of fixed-dose combinations (FDCs) as they contribute to preventing acquisition of drug resistance; minimise prescription and dispensing errors; may improve adherence by reducing pill burden. In addition, adjustment of dosage according to patient weight is easier. With FDCs, patients cannot choose which medicines to ingest (pill selection).

5.2.3.2. Single dose formulations

Using FDCs does not obviate the need for separate medicines; reasons to continue having limited supplies of single-dose formulations of anti-TB medicines include the following:

- Some patients might develop serious adverse effects to one medicine in the FDC, which will require the use of single dose formulations in a specific regimen that does not have the offending, e.g. medicine- induced hepatitis;
- Some patients with DR-TB may still benefit from selected first-line anti-TB medicines;
- The recommended dose by weight band may be unsuitable for some patients.

[4] Consider adding to the isoniazid dose if the H-resistance was listed as being due to inhA mutation, but not katG

Table 13: Dosages of FDC formulations for adults

ADULTS		
Body weight in kg	**Initial phase 2 months** [RHZE] [R150/H75/Z400/E275] Number of tablets	**Continuation phase 4 months** [RHE] [R150/H75/E275] Number of tablets
29 and below	Paediatric FDC formulations with ethambutol or single dose formulations calculated per medicine by body weight	
30-37	2	2
38-54	3	3
55-74	4	4
75 and over	5	5
For FDC doses for children <12 years of age, please refer to *Table 24*		

Table 14: Dosages of single anti-TB medicines

Generic name	Abbreviation	Adult dosage Daily treatment in mg/kg/body weight (range)	Maximum daily dose (mg)
Rifampicin	R	10 (8-12)	600
Isoniazid	H	5 (4-6)	300
Pyrazinamide	Z	25 (20-30)	2000
Ethambutol	E	15 (15-20)	1600
Streptomycin	S	15(12-18)	1000

Table 15: Dosages of single formulation anti-TB medicines by formulation

MEDICINE/ FORMULATION	ADULTS		
	Pre-treatment weight Dosage for number of tablets		
	50kg or more	Under 50 kg	
Rifampicin 150mg tablet Rifampicin 450mg	4 1 tablet plus 1 tablet of 150mg	3 1	
Isoniazid 300mg tablet Isoniazid 100mg tablet	1 -	1 -	
Pyrazinamide 500mg tablet	3	2	
Ethambutol 400mg tablet	3	2	
	CHILDREN		
	Calculate dosage by kg /body weight pre-treatment Average dose (range)		
Rifampicin 150mg tablet	15 (10-20)		
Isoniazid 100mg tablet	10 (10-15)		
Pyrazinamide 500mg tablet	35 (30-40)		
Ethambutol 100mg tablet	20 (15-25)		
Streptomycin injection	15 (12-18)		

5.4. Treatment monitoring

5.4.1. Overview of treatment monitoring

Monitoring of treatment is done using:

- Sputum-smear examination;
- Records on daily DOT and regular clinic attendance;
- Regular measurement of body weight; and
- Monitoring the patient's general clinical condition;

Sputum-smear follow-up of a patient who had clinically diagnosed pulmonary TB should be performed at the end of the intensive phase. For extrapulmonary TB it is not necessary, and often not possible, to collect further specimens during the course of treatment. Therefore, EPTB is monitoring does not include bacteriological examinations.

5.4.2. The initial (intensive) phase of treatment

The intensive phase of treatment is a critical phase in which four or more medicines ensure that the majority of TB bacilli are killed and resistant bacilli have no chance to survive. For the first line regimen, the duration is 2 months. After this, treatment shifts to a less intensive phase of treatment - the continuation phase.

Box 5: Directly Observed Treatment 1

> It is important that each daily dose during initial phase of treatment is provided as DOT

5.4.3. The continuation phase of treatment

During this phase the patient is treated with fewer TB medicines because the population of live TB bacilli is now small, and the likelihood of it containing naturally resistant mutants is very small.

Box 6: Directly Observed Treatment 1

> Each daily dose during the continuation phase should be given as DOT as well. This is particularly important in patients at high risk of poor adherence or drug resistance

5.5. Definitions of treatment outcomes

The table below shows the definition of standardised treatment outcomes.

Table 16: Definitions of treatment outcomes

Outcome	Definition
Cure	A patient with bacteriologically confirmed pulmonary TB at the beginning of the treatment who was sputum smear or culture negative in the last month of treatment and on at least one previous occasion.
Treatment completed	A patient who completed treatment but who does not have a negative sputum smear or culture result in the last month of treatment and on at least one previous occasion.
Treatment failure	A patient whose sputum smear or culture is positive at 5 months or later during treatment.
Died	A patient who dies of any cause before starting or during the course of treatment.
Lost to follow up	A TB patient who did not start treatment or whose treatment was interrupted for 2 or more consecutive months.
Not evaluated	A TB patient for whom no outcome is assigned. This includes transferred-out patients whose outcomes are not known.
Treatment success	The sum of those who are cured and those who completed treatment.

5.6. Adjunctive treatment in tuberculosis

5.6.1. Pyridoxine (vitamin B6)

Health personnel can prevent some medicine-induced side-effects, such as isoniazid-induced peripheral neuropathy which usually presents as numbness or a tingling or burning sensation of the hands or feet and occurs more commonly in pregnant women and in people with HIV infection, alcohol dependency, malnutrition, diabetes, chronic liver disease or renal failure. All adult patients should therefore receive preventive treatment with pyridoxine 25mg/day along with their anti-TB medicines. Children over 5 years of age should be given 12.5 mg daily as preventive dose.

When an adult patient has developed peripheral neuropathy, they should be treated with 50-75mg pyridoxine daily (can be increased up to a maximum of 200mg) until symptoms have disappeared, after which s/he should continue on 25mg of pyridoxine daily.

5.6.2. Steroids

Steroid treatment *should* be given for management of TB patients with the following conditions:

- TB meningitis,
- TB pericarditis

Steroid therapy should be considered in the following conditions:

- Severe allergic reactions to medicines;
- TB of the eye, larynx, kidney or adrenal glands;
- A patient with TB who is critically ill and is likely to die within the next few days.

The treatment is to be given by experienced clinicians in hospital settings only.

Table 17: Dosage of prednisolone

Disease	Dosage (adults)	Dosage (children)
Dosage (children)	*45mg b.d. for 4 weeks; 15mg b.i.d. for next 2 weeks then decrease gradually over the next two weeks or more according to clinical progress	*2-4mg/kg daily (up to a maximum of 60mg per day) The higher dose is for the more severely ill child
TB pericarditis	*45mg b.d. for 4 weeks; 15mg b.d. for next 4 weeks; then decrease gradually over two weeks according to clinical progress	
**The dosage of prednisolone has been increased by half for the first 2-4 weeks. This is because rifampicin reduces the levels of prednisolone in the body.*		

5.7. TB in special situations and management of side effects

The treatment of TB meningitis, TB during pregnancy and breastfeeding, liver disorders and renal failure is discussed below.

5.7.1. Tuberculous meningitis

TB meningitis is often diagnosed clinically, with supporting CSF findings and, occasionally, bacteriological confirmation. The regimen for treating TB meningitis is based on that for pulmonary TB, with the following considerations:

- Initial phase is for two months with rifampicin, isoniazid, pyrazinamide (and ethambutol)
- Continuation phase is with rifampicin, isoniazid (and ethambutol) for 7 to 10 months (depending on clinical response)
- Ethambutol penetrates the central nervous system (CNS) poorly, but is included here due to its presence in standardised fixed dose combinations that are easier to administer.
- Steroids should be part of the treatment for the first 6 to 8 weeks.
- Evidence from systematic reviews suggests that the core regimen stated above is adequate for most cases of TB meningitis.
- Some clinicians may add streptomycin or ethionamide for individual cases if intolerance is not an issue and the disease is severe, the rationale being to compensate for ethambutol's poor CNS penetration.
- The role of higher doses of rifampicin or preference for intravenous rifampicin is under investigation at the time of publishing these guidelines and cannot be included as standard guidance yet.
- If drug resistant TB meningitis is diagnosed or suspected because of contact with known DR-TB case, an individualised second regimen should be started empirically.

5.7.2. Pregnancy and breastfeeding

Women of childbearing age should be asked about current or planned pregnancy before starting TB treatment. A pregnant woman should be advised that successful treatment of TB with the standard regimen is important for the successful outcome of pregnancy.

A breastfeeding woman who has TB should receive a full course of TB treatment, including pyridoxine supplementation. Timely appropriate chemotherapy is the best way to prevent transmission of tubercle bacilli to the baby. Except in cases of DR-TB, the mother and baby should stay together and the baby should continue to breastfeed. Benefits of breastfeeding far outweigh any potential risk in cases of susceptible TB. After active TB in the baby is ruled out, the baby should be given 6 months of isoniazid preventive therapy, followed by BCG vaccination, if it was not given at birth.

5.7.3. Liver disorders

Patients with the following conditions can receive the usual anti-TB regimens provided that there is no clinical evidence of chronic active liver disease:

- hepatitis B or C virus infection
- a past history of acute hepatitis
- current excessive alcohol consumption.

However, hepatotoxic reactions to anti-TB medicines may be more common among these patients and should therefore be anticipated.

In patients with unstable or advanced liver disease, liver function tests should be performed at the start of treatment, if possible. If the serum alanine aminotransferase (ALT) level is more than three times the upper limit of normal before the initiation of treatment, the regimens below should be considered in consultation with clinical mentors, specialist physicians or other experts. The more unstable or severe the liver disease, the fewer the hepatotoxic medicines that should be used. It should be noted that TB itself may involve the liver and cause abnormal liver function. In severe cases of concurrent acute (e.g. viral) hepatitis not related to TB or TB treatment, it may be preferable to defer TB treatment until the acute hepatitis has resolved.

Possible regimens include:

- Two hepatotoxic medicines (rather than the three in the standard regimen):
  - **9RHE:** 9 months of isoniazid and rifampicin, plus ethambutol
  - **9RZE:** 9 months of rifampicin, pyrazinamide and ethambutol
- One hepatotoxic medicine: **2SHE/10HE**: 2 months of isoniazid, ethambutol and streptomycin followed by 10 months of isoniazid and ethambutol
- No hepatotoxic medicines: **24SELfx:** 18–24 months of streptomycin, ethambutol and levofloxacin

Expert consultation is advisable in treating patients with advanced or unstable liver disease. Clinical monitoring (and liver function tests, if possible) for all patients with pre-existing liver disease should be performed during treatment.

5.7.4. Management of medicine-induced hepatitis

Of the first-line anti-TB medicines, isoniazid, pyrazinamide and rifampicin all can cause liver damage (medicine-induced hepatitis). In addition, rifampicin can cause asymptomatic jaundice without evidence of hepatitis. It is important to try to rule out other possible causes before deciding that the hepatitis is induced by the TB regimen.

The management of hepatitis induced by TB treatment depends on:

- whether the patient is in the intensive or continuation phase of TB treatment;
- the severity of the liver disease;
- the severity of the TB; and
- the capacity of the health unit to manage the side-effects of TB treatment.

If it is strongly suspected that the liver disease is caused by the anti-TB medicines, all medicines should be stopped. Most patients will tolerate this interruption and recover appropriately. If the patient is severely ill with TB and it is considered unsafe to stop TB treatment, a non-hepatotoxic regimen consisting of streptomycin, ethambutol and levofloxacin can be started.

If TB treatment has been stopped, it is necessary to wait for liver enzymes to revert to normal and clinical symptoms (nausea, abdominal pain) to resolve before reintroducing the anti-TB medicines. If the signs and symptoms do not resolve and the liver disease is severe, the non-hepatotoxic regimen consisting of streptomycin, ethambutol and levofloxacin should be started (or continued) for a total of 18–24 months.

Once the hepatitis has resolved, the medicines are reintroduced one at a time. If symptoms recur or liver function tests become abnormal as the medicines are reintroduced, the last medicine added should be stopped. Since ethambutol and streptomycin are not hepatotoxic, they may be

introduced first, followed byrifampicin because it is less likely than isoniazid or pyrazinamide to cause hepatotoxicity, and is the most effective agent. After 3–7 days, isoniazid may be reintroduced. In patients who have experienced jaundice but tolerate the reintroduction of rifampicin and isoniazid, it is advisable to avoid pyrazinamide.

Alternative regimens depend on which medicine is implicated as the cause of the hepatitis. Possible regimens include the following:

- if rifampicin is implicated, a suggested regimen without rifampicin is 2 months of isoniazid, ethambutol and streptomycin followed by 10 months of isoniazid and ethambutol (2SHE/10HE).
- if isoniazid cannot be used, 9 months of rifampicin, pyrazinamide and ethambutol can be considered (9RZE).
- if pyrazinamide is discontinued before the patient has completed the intensive phase, the total duration of isoniazid and rifampicin therapy may be extended to 8 months (9RHE).
- if neither isoniazid nor rifampicin can be used, the non-hepatotoxic regimen consisting of streptomycin, ethambutol and levofloxacin may be continued for a total of 18–24 months.

It is preferable to re-introduce one medicine at a time, especially if the patient's hepatitis was severe. The Central Medical Stores (CMS) procure limited quantities of single-dose anti-TB medicines for use in such cases.

5.7.5. Management of skin reactions

Before attributing skin symptoms or rash to TB medications, it is important to assess if it was present before commencement of anti-TB therapy or if it can be attributed to another cause. If a patient develops itching without a rash; mild erythema or few papules and there is no other obvious cause, the recommended approach is to try symptomatic treatment with antihistamines and skin moisturisers, and continue anti-TB treatment while observing the patient closely. If a moderate skin rash (more extensive symptoms) develops, all anti-TB medicines must be stopped, pending resolution while on adequate hydration and symptomatic treatment (e.g. antihistamine, steroids).

Figure 6: Example of a stepwise re-introduction of TB medications after a skin rash

Medicine	Challenge Doses		
	Day 1	Day 2	Day 3
H	50 mg	150 mg	300 mg
R	75 mg	300 mg	600mg
Z	250 mg	1.0 g	1.5 g
E	100 mg	500 mg	1.2 g
S	125 mg	500 mg	1 g

Adapted from: TB/HIV: A Clinical Manual, 2nd edition. World Health Organisation. 2004.

If the rash is severe (including skin desquamation, mucositis, blister/bullae formation, fever) stop all medications, including anti-TBs, analgesics and ARVs, and hospitalise the patient urgently while providing intravenous rehydration and steroids. These cases require specialised care.

Once the reaction has resolved, anti-TB medicines are re-introduced one by one, starting with the medicine least likely to be responsible for the reaction (rifampicin or isoniazid) at a small challenge dose, such as 50 mg isoniazid. The dose is gradually increased over 3 days. This procedure is repeated, adding one medicine at a time (see Figure 9). A reaction after introducing a particular medicine implicates that medicine as the cause of the reaction. The alternative regimens listed in the liver disorder section above are also applicable when a particular medicine cannot be used because it was implicated as the cause of a cutaneous reaction

5.7.6. Renal failure and severe renal insufficiency

The recommended initial TB treatment regimen for patients with renal failure or severe renal insufficiency is the standard new patient regimen. Isoniazid and rifampicin are eliminated by biliary excretion, so no change in dosing is necessary. There is significant renal excretion of ethambutol and metabolites of pyrazinamide, and doses should therefore be adjusted. Three times per week administration of these two medicines at the following doses is recommended: pyrazinamide (25 mg/kg), and ethambutol (15 mg/kg).

While receiving isoniazid, patients with severe renal insufficiency or failure should also be given pyridoxine in order to prevent peripheral neuropathy. Streptomycin should be avoided in patients with renal failure because of an increased risk of nephrotoxicity and ototoxicity.

Table 18: Symptom-based approach to managing side-effects of anti-TB medicines

Side-effects	Medicine(s) probably responsible	Management
Major		***Stop responsible medicine(s) and refer to clinician urgently***
Skin rash with or without itching	Streptomycin, isoniazid, rifampicin, pyrazinamide	Stop anti-TB medicines (depends on severity- see 5.7.3)
Deafness (no wax on otoscopy)	Streptomycin	Stop streptomycin
Dizziness (vertigo and nystagmus)	Streptomycin	Stop streptomycin
Jaundice (other causes excluded), hepatitis	Isoniazid, pyrazinamide, rifampicin	Stop anti-TB medicines
Confusion (suspect medicine-induced acute liver failure if there is jaundice)	Isoniazid, probably most other anti-TB medicines	Stop anti-TB medicines
Visual impairment (other causes excluded)	Ethambutol	Stop ethambutol
Shock, purpura, acute renal failure	Rifampicin	Stop rifampicin
Decreased urine output	Streptomycin	Stop streptomycin

Side-effects	Medicine(s) probably responsible	Management
Minor		***Continue anti-TB medicines, check medicine doses***
Anorexia, nausea, abdominal pain	Pyrazinamide, rifampicin, isoniazid	Give medicines with small meals or just before bedtime and advise patient to swallow pills slowly with small sips of water. If symptoms persist or worsen, or there is protracted vomiting or any sign of bleeding, consider the side-effect to be major and refer to clinician urgently.
Joint pains	Pyrazinamide	Aspirin; non-steroidal anti-inflammatory medicines, or paracetamol
Burning, numbness or tingling sensation in the hands or feet	Isoniazid	Pyridoxine 50–75 mg daily (can be increased to a maximum of 200mg daily)
Drowsiness	Isoniazid	Reassurance. Give medicines before bedtime
Orange/red urine	Rifampicin	Reassurance. Patients should be told when starting treatment that this may happen and is normal
Flu syndrome (fever, chills, malaise, headache, bone pain)	Intermittent dosing of rifampicin (can occur inadvertently due to poor adherence)	Change from intermittent to daily rifampicin administration

5.8. Gold standards for managing TB

5.8.1. DO's of TB treatment

For TB treatment to be effective and result in treatment success, clinicians and nurses should adhere to the following principles:

- Do adhere to the treatment regimens as recommended in the national ;
- Do prescribe the correct dose for the weight band and adjust the dose if weight increases;
- Do maintain the prescribed regimen until completion of the full course, unless a patient fails treatment or develops severe side-effects requiring regimen change;
- Do apply Directly Observed Therapy (DOT) for at least:
  - » The first two months of treatment in all new patients, and preferably for the full course;
  - » The full duration of treatment for patients at high risk of drug resistance.
- Do ensure that treatment is given for 7 days a week during the entire treatment
- Do give all anti-TB medicine doses at the same time of the day. If the patient has gastro-intestinal problems all medicines should be taken immediately after a light meal.

5.8.2. DON'Ts of TB treatment

- Do not use one anti-TB medicine as antibiotic therapy in a patient who is sick and thus might have TB disease, especially in HIV positive patients
- Do not add one medicine to a failing regimen as it might lead to drug resistance;

- Do not deviate from the regimens prescribed in these guidelines, unless on the advice of the CCRC, for very specific patients with rare side-effects or resistance patterns.
- Do not give "trial TB treatment";
- Do not use any of the second-line anti-TB medicines, except when patients fit the eligibility criteria (*see Chapter 7*), and in exceptional circumstances for patients with severe adverse reactions to first line anti-TB medicines.

5.9. Patient management and support

5.9.1. A patient centred approach

TB treatment is quite demanding for the patient. The daily intake of medicines for a period of 6 months is very difficult for most patients. This must be brought to the attention of the patient from the onset of treatment by the clinician or the nurse. It has commonly been observed that without strong ongoing psychological support from health-care workers, close relatives and the community (and particularly employers), many are tempted or will actually stop their TB treatment when they start feeling better. This is particularly so when the perceived costs (direct financial costs or indirect costs of accessing treatment) are higher than the perceived benefits of completing the TB treatment, the patient is likely to discontinue or interrupt treatment once they feel better. It is therefore important to support each TB patient in such a way that it becomes more attractive and easy to complete treatment, rather than stopping it. This can only be achieved when we create a patient-centred treatment delivery system that is well accessible (geographically, culturally and financially), patient-friendly, compassionate, creative and convenient for each patient.

5.9.2. Adherence by health-care workers

It is very important that all anti-TB treatment is prescribed according to the patient regimens prescribed in these guidelines. Doctors, nurses and other health-care workers are encouraged to follow the TB management principles stated in these guidelines. Deviation from these guidelines can lead to development of resistance, including resistance to rifampicin and isoniazid (MDR-TB). Any prescription or procedures that deviate from the standard guidelines need to be justified with adequate documentation.

5.9.3. Adherence by patients

There has been a decline in the rate of loss to follow-up as a result of implementation of DOT throughout the country over the years. The health services and community have the collective responsibility of ensuring that patients started on TB treatment take all their medicines as prescribed. Community health workers are crucial in this regard, and every patient on TB treatment should be attached to a community health worker or a community treatment supporter.

5.9.4. Tracing of patients interrupting treatment

When a patient does not turn up for his daily DOT appointment or for collection of a weekly or 2-weekly medicine supply, the TB nurse should put the TB Treatment Card aside as this patient may potentially be lost to follow-up. Efforts to trace the patients should start as soon as possible with assistance of community health workers and other relevant resources. After one week without

the patient or his treatment supporter attending the facility, the TB nurse should make an effort to trace the patient and the responsible community health worker. After the patient has been traced, the reasons for treatment interruption are established and treatment is continued as before, if the interruption has been less than 2 months.
A patient is declared lost to follow up if treatment has been interrupted for a period of at least 8 consecutive weeks (two months) and all efforts to put the patient back on treatment have failed. Efforts to trace the patient should be made and carefully documented before s/he is classified as lost to follow-up.

5.9.5.Management of patients who interrupt treatment, and those who are lost to follow-up
The management of patients who interrupted treatment is complex and takes into consideration several variables (sputum-smear status, stage of treatment, degree of remission of the disease after the previous treatment, probability of drug susceptibility or resistance) that may be difficult to assess. The actions to be taken under such conditions are described in the following table.

5.9.7. Directly Observed Treatment and patient support
DOT during the entire treatment course is often the surest method to ensure full adherence and treatment success. In a strict definition, DOT is the act of observing a TB patient swallowing his prescribed medicines, while a broad definition involves providing continuous psychological and moral support to the patient in his/her endeavour to successfully complete his TB treatment. This requires an empathetic attitude from the treatment supporter, and a genuine commitment to help the patient with their problems. This also requires continuity in the patient-provider relationship, in order to create bonding and mutual respect. During the admission phase the health-care worker discusses the possible options for DOT with every patient, until a DOT supporter that best suits the needs of the patient has been identified. It is preferable that patients receive DOT within the community, once a reliable community health worker and/or treatment supporter has been identified for the patient.
The patient's TB treatment card will be kept at the nearest TB clinic, where the patient or his treatment supporter comes to collect TB medicines on a regular basis. The nurse at the TB clinic provides the CHW or treatment supporter with a *Community Based DOT Card*), on which each daily DOT intake is recorded. When a new supply of medicines is collected the nurse will check the DOT card and ensure that medicine intake was daily. When the patient wishes to move to another address or wants to change the DOT supporter, s/he should report this to the TB clinic, which will facilitate the transfer, and this is recorded in the *Facility TB register.*

Table 19: Actions after interruption of treatment

<table>
<tr><th colspan="4">Interruption for less than 1 month</th></tr>
<tr><td colspan="4">• Trace the patient
• Establish the cause of interruption and, where possible, solve the problem
• Continue treatment and prolong it to compensate for the doses not taken</td></tr>
<tr><th colspan="4">Interruption for 1 – 2 months</th></tr>
<tr><th colspan="2">Action 1</th><th colspan="2">Action 2</th></tr>
<tr><td rowspan="3">• Trace patient
• Solve the cause of interruption
• Obtain one sputum samples for smear microscopy
• Continue treatment while waiting for results</td><td>If smears negative or EPTB</td><td colspan="2">• Continue treatment and prolong it to compensate for missed doses</td></tr>
<tr><td rowspan="2">If smear is positive</td><td>Treatment received < 5 months</td><td>• Collect sputum for first line LPA
• Continue treatment and prolong it to compensate for missed doses if susceptible
• Monitor closely</td></tr>
<tr><td>Treatment received > 5 months</td><td>• Manage as a treatment failure
• Collect sputum for first line LPA & review the results
• Consider repeating the first line regimen if adherence was known to be poor, and it is presumed to be pan- susceptible TB
• Final treatment regimen may depend on LPA results and expert consultation.</td></tr>
<tr><th colspan="4">Interruption for 2 months or more (loss to follow up)</th></tr>
<tr><td rowspan="4">• Obtain diagnostic sputum sample for Xpert MTB/RIF
• Solve the cause of interruption, if possible
• No treatment while waiting for Xpert results</td><td>Xpert negative or EPTB</td><td colspan="2">Clinical decision on individual basis whether to restart or continue treatment, or no further treatment</td></tr>
<tr><td rowspan="3">Xpert positive (MTB detected)</td><td>Rifampicin susceptible and smear positive</td><td>• Collect sputum for first line LPA and review the results
• Start treatment with the first line regimen from the beginning</td></tr>
<tr><td>Rifampicin susceptible and smear negative</td><td>• Start treatment with the first line regimen from the beginning</td></tr>
<tr><td>Rifampicin resistant</td><td>• Follow-up results of second line LPA and phenotypic DST
• Apply the regimen eligibility checklist and prepare for DR-TB treatment</td></tr>
</table>

5.10. The organisation of treatment

5.10.1. Registration

After TB diagnosis, the patient is immediately registered in the Facility TB Register, and anti-TB treatment is started without delay. Patients should still be registered once a diagnosis has been made, even if they are not available to be put on treatment, but the team should make all efforts to expeditiously treat TB patients. No patient should be treated for TB without being registered, but TB patients should be registered even if they cannot be put on treatment.

5.10.2. Hospital admission

While it is not mandatory to admit patients on first line anti-TB treatment, it is often necessary to keep the patient in hospital until the conditions for proper ambulatory DOT have been established. During this admission the patient should undergo a full clinical assessment, including HIV testing (if this has not been done). They should only be discharged if they are fit enough to continue ambulatory treatment, if they understand all they need to know about their TB treatment and after a CHW or treatment supporter has been identified and educated. During admission the following should be covered:

- Education on TB treatment and importance of testing for HIV;
- HIV testing and counselling;
- Comprehensive clinical care for conditions other than TB, including HIV, diabetes mellitus and alcoholism;
- Education on co-trimoxazole preventive therapy (CPT) and ART, if HIV positive;
- Education on proper nutrition;
- Education on the need to have a treatment supporter who takes co-responsibility for DOT during the entire TB treatment.
- Administration of anti-TB medicines, which should be given under direct observation. This will serve to prime the patient for ambulatory DOT
- Information on the community-based organisations operating in the patient's locality, as well as the services they provide.

5.10.3. Ambulatory DOT

Once a patient has been started on treatment, they should be assigned a responsible community health worker (CHW) and referred to the health facility nearest their place of residence. This health facility will be responsible for the provision of anti-TB medicines, monitoring the patient's treatment (clinically and using sputum-smears), as well as tracing the patient who has missed an appointment. The treating team which includes the assigned CHW will discuss with the patient, how best DOT can be ensured at the patient's convenience. The following options of DOT are discussed with the patient:

5.10.3.1. Health facility-based DOT

DOT is provided at a health facility that is situated conveniently close to the patients' home or on his way to work. The patient takes the medicines every day under observation by the health care worker, except on weekends when the patient may take his/her anti-TB medicines at home.

5.10.3.2. Community-based DOT

Various options for community-based DOT exist, and the patient should be assisted to select the most suitable

DOT option. It should be noted, however that this option is not fixed, as the patient might need to change from one option to another during TB treatment depending on various social circumstances.

a) Workplace DOT

DOT can be provided by a healthcare worker in the medical services at the work place, or by a lay person in the organisation. If this is a feasible option for the patient, the health facility nurse or CHW should contact the employer or supervisor and discuss the possibilities of workplace DOT with the relevant person. The workplace DOT supporter should then come to the clinic with the patient where both should receive intensive education and instructions on the TB treatment, and the importance of daily DOT. A CB-DOT Card should be opened and given to the workplace DOT supporter. The health facility nurse or CHW should record details of the workplace DOT supporter on the *TB Treatment Card* and in the *Facility TB Register*.

Anti-TB medicines are given to the workplace DOT supporter for periods of 1 to 2 weeks in the intensive phase, and periods of 2 to 4 weeks during the continuation phase. When coming to collect more TB medicines, the patient or DOT supporter should bring the CB-DOT card and the blister cell sheets from the previous period. The nurse or CHW should verify that daily DOT is recorded, count any remaining tablets, and copy the doses taken on the *TB Treatment Card* which is kept at the clinic. A new supply of TB medicines is provided, and recorded on both CB-DOT Card, and recorded on *TB Treatment Card*. Workplace DOT supporters must be supported by the CHW, who checks on the patient regularly.

b) Community health worker-assisted DOT

A CHW or other health care worker in the neighbourhood of the patient takes responsibility for daily DOT at the patient's house (or the CHW's house) or at another agreed location during the full treatment period. Name, address and possibly telephone number of the CHW must be known and recorded on the *TB Treatment Card, TB Patient Identity Card and CB-DOT Card*. CHWs must by supervised by the health facility nurse.

c) Guardian-based DOT

A guardian is a lay-person from the patient's home or neighbourhood, who is willing to take joint responsibility for the patient's TB treatment. When the patient is a child, the guardian will most likely be one of the parents. The guardian should come to the health facility and receive intensive education and information on TB and its treatment and the importance of DOT until the end of treatment.

The guardian's name and address are recorded on the *TB Treatment Card* and in the *Facility TB Register*. *A CB-DOT card* is opened for the patient, and the guardian is instructed on how to record each daily intake of TB medicines. TB medicines are given to the guardian or patient for periods of 1 week in the intensive phase, and periods of 2-4 weeks during the continuation phase. When coming to collect more TB medicines, the patient or guardian brings along the *CB-DOT Card* and the blister cell sheets of the previous period. The nurse or TB field promoter should verify that daily DOT is recorded, count any remaining tablets, and copy the doses taken onto the *TB Treatment Card* which is kept at the clinic. If all is well a new supply of anti-TB medicines is provided and recorded on both *CB-DOT Card* and the *TB Treatment Card.* Guardians must be supported by the CHW, who checks on them and the patient regularly in the community.

5.10.4. Information, education and communication on TB and HIV

As soon as possible the patient should receive information and education on TB, its treatment and duration, and possibilities of social and nutritional assistance during treatment. It is very important that the patient understands the link between TB and HIV, and the importance of knowing his/her HIV status. It is poor clinical practice and potentially stigmatising not to discuss HIV with a TB patient. If the patient is unable to communicate, the family should be informed about the need of HIV testing and counselling. If the patient

does not want to be tested this decision must be respected, but opportunities should be created to continue offering the patient additional counselling and testing whenever they are ready.
The TB patient with HIV should be told about cotrimoxazole preventive therapy, and when and how s/he will be started on ART. The importance of disclosing HIV status to relatives and friends who can support him during both TB and HIV treatment should also be discussed.

5.10.5. Nutrition

Good nutrition during TB treatment is important for a good recovery of the patient, even more so when the patient also has HIV. A balanced diet with high protein content is recommended. TB patients with advanced HIV infection need additional support if they have gastro-intestinal problems such as diarrhoea, or candidiasis.

5.11. Contact investigation

5.11.1.Overview of contact investigation

Contact investigation is a systematic process for identifying previously undiagnosed cases of TB among contacts of an index case. It consists of identification, prioritisation and clinical evaluation of contacts, so as to identify candidates for preventive treatment. Contact investigation is also a gateway to identifying many undiagnosed cases in the community (active case finding), as the prevalence and incidence of active TB is often highest among contacts of TB cases.
TB contacts are people who have been exposed to patients with infectious TB. Emphasis is placed on household contacts and other close contacts. A household contact is a person who has shared the same enclosed living space as the index case for one or more nights during the 3 months before the start of current treatment. This definition also extends to other close contacts, who may have shared the same enclosed space during frequent or extended daytime periods with the index case in the 3 months preceding the diagnosis of TB.
An index case is the initially identified case in a household or other comparable setting, but is not necessarily the source case – a term referring to the first person who is responsible for transmitting the disease to others in that setting. These guidelines recommend contact investigation for all index cases, but priority may be given to index cases who are bacteriologically positive; are HIV positive; are children under the age of five or have confirmed or suspected drug-resistance.

5.11.2. Identifying close contacts

Household contacts are at high risk for TB infection and progression of infection to disease. For each index case, a list of household and other close contacts and their ages is compiled and recorded in the treatment card. At this point, it is more important to obtain a comprehensive list (despite absence or presence of symptoms among contacts).
The age and the HIV status (if known) are used to prioritise contacts who need screening. Presence or absence of symptoms (if known) may alert to potentially undiagnosed cases and possibly source cases.

5.11.3. Screening of contacts

For each of the contacts identified as listed above, a screening procedure is prepared. Ideally, it will consist of preparation of a *contact investigation slip* and a visit to the contact's home or workplace. If that is not

possible, the contact is invited to the health facility for screening. The aim is to screen every contact on the index patient's list.

The screening procedure is largely symptomatic, and comprises asking eight questions assessing the following:

- Presence of symptoms such as cough; significant weight loss, or poor weight gain in children; fever; night sweats; and lymph node enlargement
- Risk for progressing from latent TB infection to active TB, based on age, HIV status and presence of other cause of immunosuppression.

Contacts who report any of the symptoms must be further assessed by a nurse at the health facility and, where possible, a diagnostic specimen obtained for mycobacteriological testing. Early identification means a better chance of cure and, especially, a reduction in further transmission. The box below summarises the questions that should be asked during the contact screening procedure.

Box 7: Questions to be asked of every contact during screening for contact investigation Providing preventive treatment

Screening questions (to be answered by the contact themselves or a guardian in case of a child)

1. Are they coughing?
2. Are they experiencing recent weight loss (for children, poor weight gain is equivalent to weight loss in an adult)?
3. Are they having a fever?
4. Are they having drenching night sweats?
5. Do they have abnormal swellings in the neck, armpits or groin (lymph node enlargement)?

If yes to any symptom, consider collecting a specimen and/or testing further for TB.

Questions to identify contacts for preventive treatment

6. What is their age?
7. Do they know their HIV status?
8. Do they fall into any of the other risk groups such as diabetes; people taking long-term corticosteroids, interferon or other immunosuppressants; transplant patient or other immunosuppressive condition?

If under the age of 5 or HIV positive or falling in any of the other special groups, consider giving preventive treatment at the health facility

5.11.4. Providing preventive treatment

Certain categories of contacts will require preventive treatment (also referred to as treatment of latent TB infection) once symptoms have been ruled out. Unless otherwise specified, the provisions below do not apply to contacts of index patients with rifampicin or isoniazid-resistant TB.

5.11.4.1. Children under the age of five years

Child contacts of TB cases are at a higher risk of progressing to active TB once infected, with incidence of up to 50% in those under the age of 1 year. Moreover, those who get active TB are at a higher risk of complications

such as disseminated TB and TB meningitis, which carry a higher mortality. Once symptoms are ruled out, i.e. answered "no" to all the 5 screening questions), all child contacts must be offered tuberculosis preventive therapy (TPT). A 6-month course of isoniazid is the preferred TPT option for child contacts. Older children (over 5) may also be considered for TPT on a case-by-case basis (decision to be made by the medical officer).

5.11.4.2. HIV positive contacts

All HIV infected individuals are eligible to be offered preventive therapy at some point. If an HIV positive contact is found and they are without symptoms ("no" to all the 5 screening questions), they should be asked if they are currently on TPT. If not, TPT must be offered in line with the National Antiretroviral Treatment Guidelines). This provision is irrespective of previous TPT intake.

5.11.4.3. Other high-risk contacts

Contacts who are diabetic; take long-term corticosteroids, interferon or other immunosuppressants; those who have received organ transplant and those with other immunosuppressive conditions or risk as determined by a medical officer may also be offered TPT.

5.11.4.4. Other services for contacts

The contact investigation process should enable contacts to access other health-care services they would have otherwise missed. Contacts who do not know their HIV status should be offered an HIV test, while those who are HIV positive and not registered for treatment or comprehensive care should be offered that service. Contacts and other family members should receive counselling and education on the symptoms that should prompt them to seek medical attention, especially for children and people with HIV, in whom TB can progress rapidly.

The home visit is also an opportunity for an environmental assessment of the residence, education on TB and infection control measures and an opportunity for identifying a need for social support. It also verifies the index patient's existing social network in order to support DOT.

5.11.4.5. Contacts who are diagnosed with TB

The index of suspicion for TB among close contacts should be high, particularly in children and those with HIV. In the event that bacteriologic tests are negative, TB may be clinically diagnosed in a symptomatic contact by a medical officer. Bacteriologically positive contacts are more straightforward, and they must be registered and started on treatment without delay, even at the peripheral health facilities.

It is neither necessary nor appropriate to routinely conduct a tuberculin skin test (Mantoux) on asymptomatic child contacts then starting full anti-TB treatment if it is positive. Similarly, the use of chest X-ray to assess asymptomatic contacts should not be routine. A tuberculin skin test and/or chest X-ray is recommended to support a clinical suspicion of active TB.

5.12. Roles and responsibilities of various care providers in DOT

5.12.1.Nurse

The nurse in the TB treatment team is the cornerstone of a well-functioning TB programme, as s/he is responsible for ensuring that the patient completes treatment successfully. It requires talent, skill, experience

and interest to motivate a patient to successful completion of treatment. Managing a TB clinic is not a task any nurse can do well. S/he must be knowledgeable about all practical aspects of TB and HIV management and must be able to discuss confidently with any patient about issues around TB and HIV. Additionally, s/he must be patient, compassionate, empathetic and creative in finding solutions to the patients' individual problems related to the disease or the treatment.

It is important that nurses are carefully selected as "TB nurses", based on the required attitude and personal interest in TB; that they stay on as TB nurses for a prolonged period of time in order to become experienced and competent via in-service training, and receive on-the-job training from their supervisors.

Frequent and poorly structured rotation of nurses in TB treatment units at short intervals of 3-6 months is often counter-productive as it may cause lack of continuity, incompetence, and many patients to interrupt treatment due to disruption of established rapport.

5.12.2. Medical officer

The role of the medical officer (doctor) is mainly limited to the diagnosis of TB and the management of complications. The large majority of the TB patients do not need to see a doctor again after diagnosis, in unless there are complications. Most patients can be managed well by the TB nurses. The following patients should be reviewed by the doctor:

- Bacteriologically negative patients who require a clinical diagnosis of TB.
- Patients with suspected EPTB. These patients require thorough clinical assessment at baseline and as part of their monitoring. Often there is need to assess complications of the TB, as in the case of spinal TB, TB meningitis and pericardial TB.
- All patients who are not improving on treatment, including those who are smear-positive on follow-up smear examination.
- Patients for whom the regimen has been modified due to side effects.
- All patients with rifampicin resistant TB. This review should also include an assessment of the pre-treatment DST results and in particular the 2nd line LPA results. The medical officer participates in completing the 2nd line regimen eligibility checklist.

5.12.3. Community health-care workers

CHWs, including those previously referred to as "field promoters" are lay persons from the community who have received special training and may be attached to a health facility, community or to a TB treatment points (DOT point). They are an extension of the services provided at established health facilities and should have knowledge in TB treatment and case-finding. CHWs refer symptomatic patients for TB diagnosis and provide support to the TB nurses regarding IEC, observation of treatment, recording and tracing of patients who interrupt treatment. Furthermore, they are expected to assist with contact investigation and provide direct observation of treatment, as well as supporting community education on HIV and other health promotion activities.

5.12.4. Other care providers

Several other care-providers play a significant role in supporting DOT, and this role should not be minimised. These include pharmacists, social workers and rehabilitation professionals. Nurses, medical officers and CHWs are emphasised here because of their repeated contact with every patient during their course of treatment.

Table 20: Summary of roles and responsibilities in TB care

Role/ responsibility	Medical officer (doctor)	TB Nurse	Community Health Worker
TB diagnosis	Identifies presumptive TB cases. Diagnoses all forms of TB.	Identifies presumptive TB cases. Organises sputum examination and traces results. Diagnoses bacteriologically confirmed TB.	Refers sick community members for assessment at health facility Refers presumptive TB cases for testing.
Initiation of treatment	Classification of patient. Prescription of correct regimen.	Classification of patient. Registration of the patient. Prescription of correct regimen Organisation of DOT and contact investigation.	Organisation of DOT. Assuming responsibility for DOT. Contact investigation
Follow-up sputum-smear examination	Ensures that follow-up sputum samples are collected in line with NTLP guidelines	Sputum collection according to NTLP guidelines	Ensures that patients submit sputum.
DOT	Technical backstopping for nurses	Organise most convenient DOT option for the patient, administer Clinic based DOT	Provides DOT
Discharge from treatment	Assesses all other patients due for discharge	Discharges PTB patients who are fit and have been cured from treatment.	Monitors timing of treatment
Management of minor side-effects	Diagnoses, advises and provides simple remedies described in these guidelines	Diagnoses, advises and provides simple remedies described in these Guidelines	Identifies and refers patients with side effects to nurse Provides moral support.
Management of major side-effects	Diagnoses and manages all patients with major side effects	Diagnoses and refers to doctor	Provides moral support and refers patients with complications.
Management of patient with treatment failure	Diagnoses and manages according to guidelines	Diagnoses and refers to doctor	Identifies and refers patients who are not doing well
Management of patient who returns after interruption	Diagnoses and manages according to guidelines	Organises sputum examination and traces results. Diagnoses and refers to doctor. Manages new treatment plan	Provides moral support to prevent interruption. If interruption occurs, traces patient and informs nurse.

6. TUBERCULOSIS IN CHILDREN

6.1. Background

Globally, children less than 15 years old comprise 10% of all TB cases. However, in TB-endemic areas such as Sub-Saharan Africa, children can account for up to 20% of cases. The source of TB infection in a young child is usually an adult, generally a family member living in the same household, with bacteriologically positive PTB. TB in children therefore reflects failed TB control in adults.

Young children (<5 years old), and those with risk factors such as malnutrition and HIV infection are at particular risk for primary progressive TB because of their weakened immune systems. Children who develop TB usually do so within 2 years of infection and are less likely to present with reactivation disease.

Management of TB is generally similar in adults and children. This chapter will focus on the considerations specific to the management of TB in children.

6.2. Diagnosis of TB in children

6.2.1. Overview of TB diagnosis in children

The diagnosis of TB in a sick child relies on a thorough assessment of all the evidence from a careful history, clinical examination including growth assessment and relevant supporting investigations such as chest x-ray examination, and tuberculin skin test (TST). Although bacteriologic evidence of infection should be sought, results may be falsely negative and fail to confirm the disease. In such cases, a diagnosis should rely on the other clinical features.

Clinicians should exercise a high index of suspicion in a child presenting with suggestive symptoms, especially with HIV-infected children and with those who have a history of close contact to an index patient with bacteriologically positive PTB. Nevertheless, clinicians should always consider other diseases to avoid over-diagnosis and unwarranted treatment for TB while failing to recognise other causes of symptoms. As in adults, diagnosis by "trial therapy" is not recommended in children.

Box 8: Key features suggestive of TB in children

The presence of *two or more* of the following suggests a diagnosis of TB:

- Persistent symptoms suggestive of TB
- Physical signs suggestive of TB
- Chest X-ray examination findings suggestive of TB
- A positive TST

Close contact with a bacteriologically positive TB case greatly increases the likelihood of TB

6.2.2. History

A detailed and careful history should be taken, which should include the following.

Contact history:

- Household or other close contact with a person with TB
- Household or other close contact with anyone with a chronic cough
- Household / family member with HIV (such persons would be more likely to have TB than HIV- negative household contacts)

Previous medical history:

- Previous TB treatment and outcome of treatment
- Previous TPT
- HIV test result

Current illness:

- Progressive, unremitting cough that is not improving and has been present for 2 weeks
- Unexplained fever (temperature ≥38°C) for 2 weeks
- Night sweats
- Fatigue, reduced playfulness, decreased activity
- Weight loss or failure to gain weight: stagnation or decrease in growth noted on growth chart Weight for age -2 to -3 z-score[5] (underweight) or less than -3 z-score (severely underweight)
- Decreased appetite
- Respiratory infection or meningitis not responding to antibiotics
- Febrile illness not responding to anti-malarial medication in a malarious area

6.2.3. Clinical examination

A good clinical examination should look for signs consistent with TB disease, which may include:

Lymphadenopathy

- Large painless, generally soft, lymph nodes with or without fistula formation – particularly cervical

Respiratory signs

- Tachypnoea, signs of respiratory distress
- Adventitious sounds on auscultation (crackles, bronchial breathing)
- Reduced air entry or dullness to percussion in lower lung field(s) (pleural effusion)
- Audible wheeze, often asymmetric due to enlarged intra-thoracic lymph nodes not responsive to bronchodilator therapy

Cardiac signs

- Pericardial friction rub, distant / muffled heart sounds (pericardial effusion)

Abdominal signs

- Distended abdomen with or without ascites

Bones and joints

- Gibbus deformity due to collapsed vertebrae in the spine
- Progressive non-painful swelling or deformity of joints or bone, with or without sinus formation

Central nervous system

- Change in temperament, convulsions, coma - especially if sub-acute, developing over several days (meningitis)

[5] z-scores refer to standard deviations. -2 z-score is -2 standard deviations from the mean. A child whose weight is -2 z-score, is underweight. A child whose weight is -3 z-scores, is severely underweight.

6.2.4. Bacteriological confirmation of tuberculosis

Pulmonary TB is the most common type of TB seen in children, but children rarely have bacteriologically positive sputum, making the diagnosis of PTB difficult to confirm. Contributing factors include the inability of small children to produce sputum, the fact that children tend to swallow sputum, and the greater likelihood of having primary TB infection in children. As with adults, diagnosis of EPTB may require tissue sampling for confirmation.

All efforts should be made to collect specimens for bacteriological confirmation before or at the start of TB treatment. For children with previously treated TB or those suspected of exposure to DR-TB this is particularly critical.

The Xpert MTB/RIF test is recommended as the initial test because of its rapidity and ability to diagnose drug resistance within a few hours, as opposed to several weeks with conventional culture-based methods. Although the high sensitivity of this test makes it ideal for the detection of TB among children, specimens collected from children should be sent for the more sensitive mycobacterial culture if the Xpert MTB/RIF is negative.

6.2.4.1. Collection of sputum specimens

a) Sputum expectoration: Older children (sometimes as young as 5 years) can produce sputum if adequately encouraged and instructed. Spot and early morning specimens should be obtained following the methodology described in Chapter 4.

b) Sputum induction with saline: Deep coughing can be induced by inhalation of an aerosol of warm, sterile, hypertonic (3-5%) saline and is a useful procedure for children and adults who cannot cough up sputum. The procedure should be performed by staff who have been trained to do it. The inhalation apparatus is the same as that used for patients needing inhalation therapy, for example, giving a bronchodilator for an acute asthmatic attack. However, care should be taken to carry out the procedure in a well-ventilated place and all personnel in the room should wear N95 respirators The patient should fast for 3-4 hours prior to the procedure to prevent vomiting and aspiration. In addition, the procedure should not be done if the child is bleeding, has respiratory distress, reduced level of consciousness or a history of significant asthma.

   A bronchodilator such as salbutamol should be administered to reduce the risk of wheezing. Nebulised hypertonic saline should then be administered for 15 minutes or until 5ml of solution has been fully administered, whichever comes first. Chest physiotherapy may be necessary to mobilise secretions. Older children may then be able to expectorate and sputum can be collected. For younger children suction of the nasal passages or nasopharyngeal aspiration may be done to collect specimens.

   Induced sputum is watery and resembles saliva; therefore, specimen bottles should be clearly labelled ‘induced sputum’. The samples will be tested using Xpert MTB/RIF and, if negative, sent for culture.

6.2.4.2. Gastric aspiration

Because children with TB may swallow sputum containing M.tb, gastric aspiration can be used to confirm the diagnosis in children who are unable to expectorate spontaneously and where induced sputum cannot be obtained. All gastric aspiration specimens should be tested for TB using Xpert MTB/RIF and also sent for culture. The diagnostic yield from gastric aspirates may be low, therefore

a negative bacteriological test on a gastric aspirate does not necessarily exclude TB.
The highest yield of gastric aspirate specimens for TB is in the morning when the child has been fasting for at least 4 hours. Refer to the box below on how to perform gastric aspiration; the procedure usually requires 2 people.

Box 9: How to perform a gastric aspiration for TB testing

Insert the appropriately-sized nasogastric tube, attach a syringe and withdraw 2-5 ml of gastric contents. If no fluid is aspirated, insert 5-10 ml of water or normal saline and attempt to aspirate again. Withdraw at least 5-10 ml of fluid. If this is unsuccessful, attempt a maximum of 3 times.
Decant the extracted fluid into a specimen container with an equal volume of 8% sodium bicarbonate. This neutralises the stomach acid and therefore prevents destruction of the tubercle bacilli.
Forward the specimen to the laboratory for Xpert MTB/RIF testing and mycobacterial culture as mentioned above.

Gastric aspiration should not be performed if the child is known to have a bleeding disorder or a low platelet count.

6.2.5. Diagnosis of extrapulmonary TB (EPTB)

Bacteriological confirmation should be sought if possible, in cases of suspected EPTB. The approach will vary with the site (see Table 21), and is similar to that used in adults except that children may require sedation or general anaesthesia to obtain some specimens.

Table 21: Diagnostic procedure for suspected EPTB in children

Site	Procedure
Peripheral lymph nodes (especially cervical)	Fine-needle aspiration or biopsy
Miliary TB	Chest radiography
TB meningitis	Lumbar puncture (head CT scan if available)
Pleural effusion	CXR, consider pleural tap
Abdominal TB	Abdominal ultrasound, consider tap of ascitic fluid
Osteo-articular TB	x-ray examination, joint tap or synovial biopsy
Pericardial effusion	Chest radiography, cardiac ultrasound, consider pericardial tap

6.2.6. Chest radiography (x-ray examination)

Although radiography findings tend to be non-specific in children, they can provide supportive evidence of PTB disease. Radiography must always be performed if a bacteriological confirmation cannot be obtained and the contact history is negative or unclear in a child suspected of having TB. Abnormalities seen on chest radiographs include:

- Widened mediastinum due to enlarged hilar or mediastinal lymph nodes
- Persistent parenchymal opacification (generally with ipsilateral hilar lymphadenopathy)
- Miliary mottling in the lungs (uniform, small, millet-sized infiltrates throughout both lung fields)
- Pleural or pericardial effusion, especially in older children
- Rarely, cavitation may occur in older children and adolescents

Overlapping chest radiograph findings may be seen in children with other pulmonary conditions. This is especially common in children with HIV (see Section 6.2.9).

6.2.7. Tuberculin Skin Test (TST)

The TST has a supportive role in the diagnosis of TB in symptomatic children when used with other diagnostic tests. A positive test result suggests infection with M.tb, not TB disease. This test is particularly useful when a bacteriological confirmation cannot be obtained in a symptomatic child, and there is insufficient evidence to make a diagnosis of active TB. Children should not be commenced on full treatment for TB solely on the basis of a positive TST.

The sensitivity of TST is reduced by HIV infection, severe malnutrition and severe TB disease. The positivity of the TST result decreases with increasing immunosuppression.

TST should be regarded as positive in high risk children such as those with HIV infection and severe malnutrition if the diameter of induration is ≥5mm when read between 48-72 hours later. In all other children (including those who have had BCG vaccination) a diameter of ≥10mm indicates a positive test.

6.2.8. HIV test

As in adults, TB is more common in HIV-infected children. The risk for developing TB in HIV-infected children in a TB endemic setting may be 20 times higher than the risk for HIV-uninfected children. An HIV test should be performed for all children suspected of or diagnosed with TB. This will allow appropriate initiation of treatment for HIV as well as TB and will improve survival. All HIV positive children or those HIV-exposed infants at least 6 weeks of age with unknown HIV status who have TB should be started on cotrimoxazole prophylaxis. A plan should be made to commence ART for all HIV positive children ideally 2 weeks after starting TB treatment. Figure 7 outlines a simplified approach to making a diagnosis of TB in children, depending on the HIV status.

6.2.9. Diagnostic challenges in HIV positive children

HIV makes the diagnosis of TB in children more difficult. Malnutrition is a common presenting feature in children with TB disease and with HIV infection. Children with HIV commonly have acute and chronic respiratory disease caused by pathogens other than M.tb but with similar clinical and radiological features. In addition, there is often co-infection or other respiratory co-morbidity,

thus possibly masking response to therapy. Box 10 summarises some of the causes of lung disease that can be confused with TB in HIV- infected infants and children.

Box 10: Other causes of lung disease in HIV-infected children

Causes of lung disease in HIV-infected infants <1 year of age in general order of frequency:

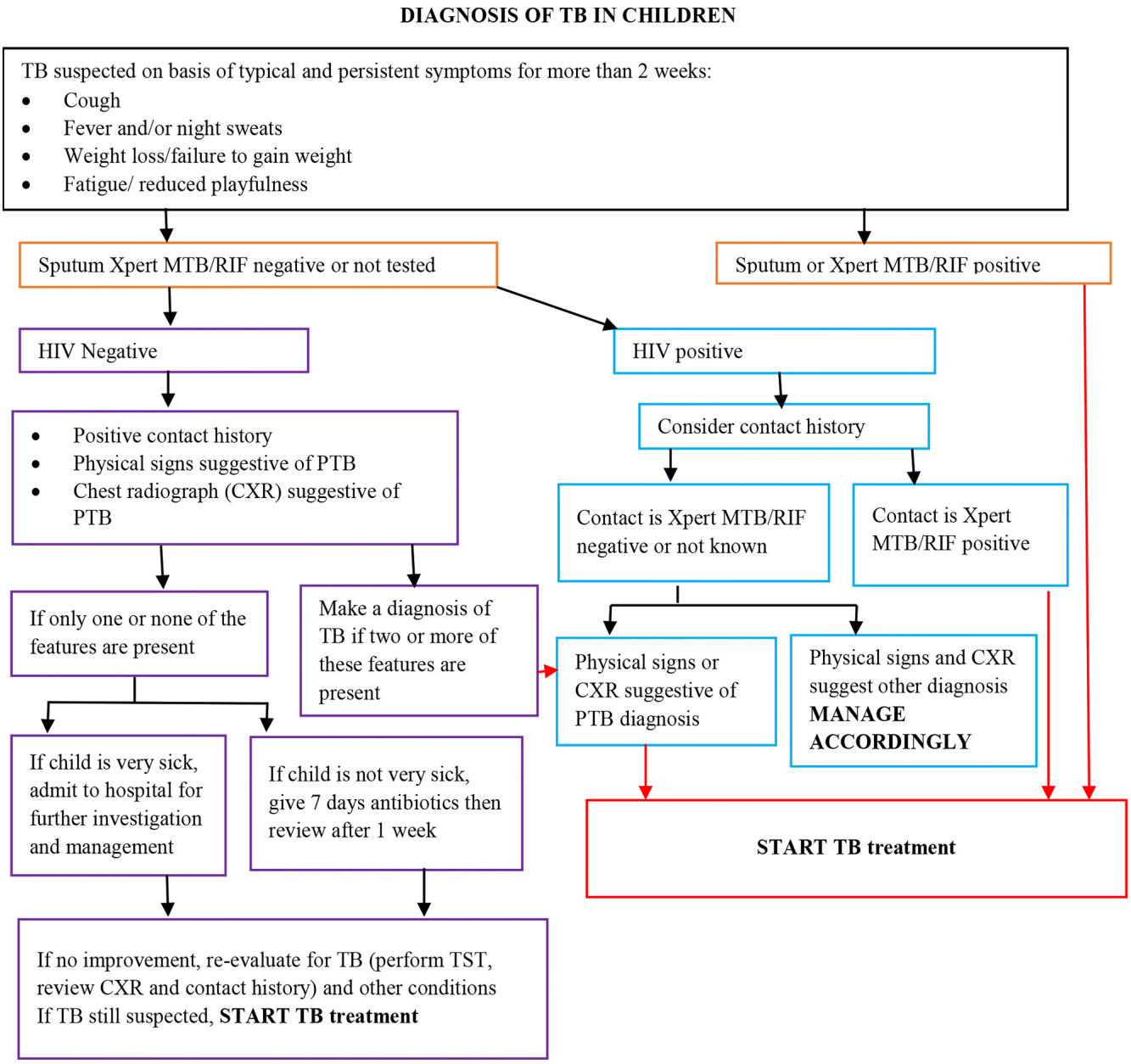
- Bacterial pneumonia: pneumococcus, staphylococcus, gram negative organisms. TB can present as acute pneumonia in this age group
- PCP: common cause of severe, fatal pneumonia in the 2-6-month age group, therefore all infants with pneumonia should be given high-dose cotrimoxazole in addition to other therapy
- CMV pneumonia: sometimes co-infection with PCP, probably more common than previously recognised as it is difficult to confirm a diagnosis
- Viral pneumonia: (e.g. respiratory syncytial virus) often associated with bacterial co-infection
- Mixed infection: commonly seen with PCP, bacterial and viral pneumonia and TB
- Measles: usually see a typical rash
- LIP: uncommon in infants

Causes of lung disease in HIV-infected children 1-14 years of age in general order of frequency:

- Bacterial pneumonia: pneumococcus, staphylococcus, gram negative organisms
- – very frequent, often recurrent
- TB
- LIP: especially 2-6 years of age, persistent or recurrent, associated with clubbing and parotid enlargement
- Bronchiectasis: cough with purulent sputum, associated with clubbing, complicates recurrent bacterial pneumonia, lymphocytic interstitial pneumonia or TB
- Viral pneumonia: often associated with bacterial co-infection
- Mixed infection: commonly seen with bacterial and viral pneumonia, LIP and TB
- Measles: usually see a typical rash
- Kaposi Sarcoma: usually see characteristic lesions on skin or on palate
- PCP: rare in this age group
- Other fungal pneumonia: probably rare

PCP = pneumocystis pneumonia; CMV = cytomegalovirus; RSV = respiratory syncytial virus

Figure 7: Approach to diagnosing TB in children



6.3. Treatment of TB in children

Once a diagnosis of TB has been made, many children may be treated for TB as outpatients; however, children with severe disease should be hospitalised. Children with any of the following conditions must be admitted to hospital:

a) respiratory distress
b) severe forms of EPTB such as TB meningitis, miliary TB, spinal TB and pericardial TB
c) severe adverse reactions such as hepatotoxicity.

It is also reasonable to admit any child in whom it is not possible to ensure good adherence to treatment due to social or logistical reasons.

As with adults, the choice of TB treatment regimen in a child is determined by whether the child has new TB, previously treated TB, or DR-TB, irrespective of HIV status. TB treatment in children

should be given daily (7 days per week) during the intensive and continuation phases of therapy. Response to TB treatment in even young and immunocompromised children is generally good.

6.3.1. Standard first-line treatment regimens

The standard regimens for drug susceptible TB is the same for children as for adults. Exceptions to the 6- month regimen for new patients are the treatment of TB meningitis and osteo-articular (bones and joints, including spinal) TB for which duration of treatment is longer. Table 22 summarises the anti-TB treatment regimens for children with drug susceptible TB. Consultation with experts and/or specialists is recommended for complicated cases.

Table 22: Treatment regimens for drug susceptible TB in children

Indication for treatment for PTB and EPTB	Regimen
First line regimen for TB (new or previously treated drug susceptible TB)	2HRZE / 4HRE
TB meningitis and osteo-articular TB	2HRZE / 10HRE

All children receiving first line treatment regimens should have ethambutol as part of their regimen. This takes into account the high prevalence of primary isoniazid resistance in Namibia, thus making it unsafe to treat any form of TB disease with less than 4 oral medications during the initial phase. Inclusion of ethambutol in the continuation phase covers the possibility of isoniazid-resistant TB which would otherwise result in inadvertent rifampicin "monotherapy" if ethambutol was not added. Previous concerns about using ethambutol in children were addressed by WHO in a 2006 publication based on evidence from multiple studies which concluded that children of all ages can safely be given ethambutol in daily doses of 20mg/kg/day.

6.3.2. Recommended dosages

Current evidence shows that serum levels for all four oral first line anti-TB medicines are lower in children compared to adults when given at standard doses. For this reason, daily dosage recommendations for children less than 12 years old are higher than those for adults, as shown in Table 23.

Table 23: Recommended dosages of first-line anti-TB medicines for children <12 years old

Medicine	Recommended daily dose	Daily dosage range in mg/kg (maximum)
Isoniazid (H)	10 mg/kg	7-15 (300mg)
Rifampicin (R)	15mg/kg	10-20 (600mg)
Pyrazinamide (Z)	35mg/kg	30-40 (2000mg)
Ethambutol (E)	20mg/kg	15-25 (1200mg)
Streptomycin (S)	15mg/kg	12-18 (1000mg)

FDC tablets with the revised proportions of medicine components (in line with the 2010 WHO guidelines) are now available in Namibia. Children with body weight less than 25kg should receive TB treatment using the weight-banded dosage chart shown in Table 27. Over the months of treatment, it is anticipated that children will gain weight, so it is important to weigh the child at each visit and increase doses accordingly.

Remember to check that the paediatric FDC you are using contains RH at a strength of 75mg and 50mg respectively (instead of RH at 60/30 in the older FDC). Children with weight over 25kg should have treatment based on their weight according to the adult dosage table for FDCs.

Table 24: Weight banded dosing for paediatric FDCs RHZ-75/50/150 and RH-75/50

Weight bands#	Numbers of tablets			
	Intensive Phase		Continuation Phase	
	RHZ	E	RH	E
	75/50/150	100	75/50	100
4-7kg	1	1	1	1
8-11kg	2	2	2	2
12-15kg	3	3	3	3
16-24 kg	4	4*	4	4*

for infants < 4 kg, calculate doses of individual medicines and give separately
alternatively (preferably) give one 400mg tablet of ethambutol

Pyridoxine should be given along with isoniazid in HIV-infected children to prevent isoniazid associated neuropathy. A dose of 12.5 mg/day is recommended for children 5 to 11 years of age, and 25 mg/day for children ≥12 years.
Streptomycin should be reserved for drug resistant TB in children with known susceptibility to this medicine, or when there are significant adverse effects limiting the treatment options in the standard regimens.

6.3.3. Adjunctive steroid therapy

Corticosteroids should generally be used sparingly in children, but are of benefit in cases of TB meningitis, and probably TB pericarditis and complications of airway obstruction caused by TB lymphadenitis. In such cases, prednisolone should be given at a dose of 2mg/kg/day for 4 weeks. The dose should then be gradually reduced over 1-2 weeks before stopping. The dosage can be increased to 4mg/kg/day (maximum: 60mg/day) in the case of seriously ill children to account for increased steroid metabolism induced by rifampicin.

6.3.4. Monitoring therapy

Most children respond well to treatment as long as adherence is good. It is recommended that all children with TB receive directly observed therapy (DOT) for the complete duration of therapy. Parents and caregivers need to be counselled about the importance of adherence for the full treatment period and the potential adverse effects of the medicines. This counselling should be repeated at each follow-up visit.
Children being treated from home should be assessed by a health care worker at a clinic 1-2 weekly after treatment initiation, at the end of the intensive phase, and every 2-4 weeks thereafter until treatment is completed. A trained community health worker should assess the child, particularly on treatment adherence and response to treatment at least 1-2 weekly throughout treatment. At each clinic visit there should be:

- A symptom assessment including, for example, presence of cough, fever, poor appetite, and fatigue,
- A weight measurement,
- A directed physical examination depending on symptoms,
- An assessment of adherence to treatment,
- An inquiry about any adverse events,
- A review of any relevant specimen collections done or due, and
- Agreement on the date for the next visit.

Adherence is assessed by reviewing the treatment card. If medicines have been dispensed to the caregiver (DOT supporter) to take at home, the HCW should review the remaining tablets and ask about the number of each type of pill that the child is taking per day. TB treatment dosages must be adjusted according to increase in weight. The new treatment dosages should be carefully explained and demonstrated to the caregiver.

Bacteriologic response to TB therapy in children may be monitored in the same way as in adults (Chapter 5). A follow-up sputum specimen for microscopy should be obtained between 6-8 weeks and after the 5th month of treatment for any child with PTB who was bacteriologically positive at diagnosis, unless this would mean an invasive procedure such as gastric aspiration.

Routine follow-up CXR examination is not indicated. Many children have a radiological response which lags behind the clinical response to treatment. CXR examination is only useful if the child is not clinically improving despite good adherence to anti-TB treatment.

If there is poor response to anti-TB therapy (poor or no weight gain, persistent cough, fever or malaise, etc.) the child should be referred to the next level of care for further assessment and management. Effective assessments may require a team-approach including both clinical and social services staff. Collection of specimens for Xpert MTB/RIF and/or C/DST is very important in such children as well as actively trying to identify an adult source case, as this will guide future management. These children may have DR-TB, an unusual complication of PTB, other causes of lung disease, inappropriate dosages, or poor adherence to treatment. It is important to be aware that in HIV-infected children on ART, virologic failure can contribute to a poor TB outcome, and hence needs to be assessed and addressed.

6.3.5. Adverse reactions

Children generally tolerate anti-TB treatment better than adults and have fewer adverse reactions. The commonest severe adverse reaction due to anti-TB therapy in children is hepatotoxicity. For HIV-infected children, there is also the risk of IRIS (see below) and overlapping toxicities with ART and CPT. All serious adverse events should be reported to the TIPC.

6.3.6. Immune reconstitution inflammatory syndrome (IRIS)

Anti-TB treatment can be associated with a transient worsening of clinical disease a few days or weeks after starting therapy. The frequency of these reactions is increased in HIV-positive individuals on ART and is called immune reconstitution inflammatory syndrome (IRIS). It usually occurs within 3 months of starting ART. Diagnosis and management of IRIS in children is the same as in adults (see Chapter 8).

6.3.7. Treatment outcomes

Outcome definitions following anti-TB treatment in children are the same as for adults. A child's TB outcome category should be recorded on his/her TB Treatment Card. In addition, the diagnostic and outcome categories as well as the date and weight at the start and end of treatment should be recorded in the child's health passport.

6.3.8. Drug resistant (DR) TB

Children usually develop TB disease as an immediate consequence of primary infection, and as such they typically have fewer mycobacteria than adults. Therefore, anti-TB drug-resistance developing during treatment is uncommon. Most drug-resistance found in children is a result of primary infection from a source case with a drug-resistant strain. It is recommended that in a symptomatic child diagnosed with active TB who is a close contact of a known DR-TB case, the treatment should be for DR-TB according to the resistance pattern from the contact, unless the DST demonstrates otherwise.

DR-TB should be managed according to schedules described in Chapter 7, in accordance with the Guidelines for the Management of Drug-resistant Tuberculosis in Namibia. Despite worries about the limited experience with the use of 2nd line medicines in children, DR-TB is life-threatening and hence no anti-TB medicines are absolutely contraindicated. Children generally tolerate 2nd line anti-TB medicines well.

Table 25: Dosage of 2nd line medicines for children

Medicine name	Daily paediatric dose in mg/kg (max dose in mg)
Bedaquiline	400mg daily for 2 weeks, then 200mg 3 times a week
Delamanid	20 – 34kg 50mg twice daily, for 24 weeks >35kg 100mg twice daily, for 24 weeks
Levofloxacin	15 – 20 (1000)
Moxifloxacin	7.5 – 10 (800)
Amikacin	15 – 20 (1000)
Ethionamide/protionamide	15 – 20 (1000) 2x daily
Cycloserine/terizidone	10 – 20 (1000) 1x/2x daily
Linezolid	10mg/kg/dose twice daily for children < 10; 300mg daily for children ≥ 10 years of age (600)
Clofazimine	2 – 3 (200)
Pyrazinamide	30 – 40
Ethambutol	15 – 25
Isoniazid	7 – 15
PAS	200 – 300
Amoxicillin – clavulanate	80 (4000 amoxicillin and 500 clavulanate)
Meropenem	20 – 40 (6000)

6.4. Management of TB/HIV co-infection in children

All HIV-infected children with PTB and those with EPTB are clinically eligible for CPT and ART irrespective of CD4 cell count.

6.4.1. Cotrimoxazole preventive therapy (CPT)

All HIV-positive children are eligible for CPT. If a child with TB is newly diagnosed with HIV, it is important that they receive CPT as soon as possible because it improves their overall outcome. The dosage of cotrimoxazole for use in CPT is given in table 26 below.

Table 26: Recommended doses of cotrimoxazole for CPT for children

Age	Cotrimoxazole dosage
6 weeks to 5 months	2.5 ml daily*
6 months to 5 years	5 ml daily*
6 years to 14 years	10 ml* or one 400mg/80mg tablet daily
>14 years	2 x 400mg/80mg tablets daily

*Paediatric cotrimoxazole suspension contains 200mgSMZ/40mgTMP per 5 ml

6.4.2. Anti-retroviral therapy (ART)

All children with HIV infection should generally be receiving ART. There is significant evidence, that mortality from delaying the start of ART in TB co-infected children greatly outweighs any risk from medicine toxicity or IRIS. For co-infected children, it is recommended that ART be started in all HIV- infected individuals with active TB irrespective of CD4 cell count. TB treatment must always be started first, followed by ART as soon as possible within 8 weeks after starting TB treatment.

6.4.3. Preferred ART regimens for children with TB/HIV co-infection

Because of significant interactions between rifampicin and certain antiretrovirals (ARVs) such as protease inhibitors and nevirapine, these ARVs are best avoided in children being treated for TB with rifampicin. A paediatric specialist or clinical mentor should be consulted before final selection of ARVs for any individual child, especially those already on ART. See the National Guidelines for Antiretroviral Therapy for further details.

- 2NRTIs
  - For children <35 kg or <10 years old, but at least 3 months of age, the preferred choice is abacavir (ABC) with lamivudine (3TC)
  - For children who weigh at least 35 kg AND are 10 years old or more, is tenofovir (TDF) with 3TC or emtricitabine (FTC)
- NNRTI
  - Efavirenz (EFV) is the only applicable and available NNRTI that can be safely used with rifampicin. Its use is however restricted, to children ≥3 years old and weight ≥10 kg

Special considerations:

For children who are at least 3 months of age, and are <3 years old or <10kg, for whom EFV may not be given, the following options apply for use during TB treatment:

- Triple NRTIs: abacavir (ABC)/AZT/3TC or
- 2 NRTIs with "super-boosted" lopinavir/ritonavir (LPV/RTV) - this requires giving additional ritonavir (RTV) to ritonavir-boosted lopinavir (LPV/r) to achieve an equivalent total dose of LPV and RTV.

If a child is on first line ART with 2NRTIs and an NNRTI when diagnosed with TB, change the NNRTI to EFV if ≥3 years old and weight ≥10 kg and not already on EFV. If <3 years old or weight <10 kg change to one of the options above for that age group.

If a child is on first line ART with 2NRTIs and LPV/r, the options include adding additional RTV to the LPV/r ("super-boosted" LPV/RTV), changing LPV/r to ABC, or changing LPV/r to EFV.

If a child is on second line ART with 2-3 NRTIs and an NNRTI when diagnosed with TB, change the NNRTI to EFV if ≥3 years old and weight ≥10 kg and not already on EFV. If the child is <3 years old or <10 kg: consult an HIV specialist. It would not be safe to use a triple NRTI option as or to change to EFV as the child has already failed first line HIV treatment.

If a child is on second line ART with 2-3 NRTIs and LPV/r and is diagnosed with TB, add additional RTV to LPV/r to achieve "super-boosted" LPV/RTV.

Remember: two weeks after TB treatment with rifampicin is completed, the child should change to the usual first line regimen, or to the regimen he/she was taking before starting TB treatment. This is particularly important if the child has been given a triple NRTI regimen, which is less robust than an NNRTI- or PI-based regimen, or "super-boosted" LPV/RTV since once rifampicin is no longer in the blood stream causing increased metabolism of PIs, the resultant blood level is likely to be toxic.

ARVs and anti-TB medicines have overlapping potential toxicity in children as in adults (refer to the *National Guidelines for Antiretroviral Therapy).*

6.5. TB in pregnancy and during the neonatal period

6.5.1. Background

TB accounts for up to 15% of maternal mortality in southern Africa, and the relative risk of death is 3.2 times higher in TB/HIV co-infected compared to HIV-uninfected mothers. With the high prevalence of TB in Namibia it is inevitable that some pregnant women will present with TB. The risk of developing TB in pregnancy is 10 times higher in HIV-infected women than in HIV-uninfected women. About 2% of HIV- infected pregnant mothers are diagnosed with TB in TB endemic settings. Vertical transmission of TB to the infant in mothers with untreated or partially treated TB may occur in over 16%. Before the advent of anti-TB treatment, a 10-50% mortality rate in pregnant women with TB was observed.

Infants born to mothers with TB have significantly worse outcomes with more prematurity, intra-uterine growth restriction, low birth weight and perinatal death compared to women without TB. In addition, the perinatal transmission of HIV in mothers with TB/HIV co-infection is more than twice as high as in HIV-

infected mothers without TB. It is therefore essential to carefully look for and diagnose HIV and TB in pregnant women.

6.5.2. Diagnosis and management of TB in the mother

The main risk factor for perinatal mortality due to TB is starting anti-TB treatment late in the mother, after the 1st trimester. Occasionally, mothers are diagnosed with TB only after TB is suspected or confirmed in the infant. The clinical presentation of TB in pregnancy is variable and may be challenging. Some symptoms of pregnancy such as fatigue can mask TB symptoms. The commonest form of TB seen in pregnant women is PTB, and the most common form of EPTB is pleural effusion with, as expected, an increased incidence in HIV-infected mothers compared to HIV-uninfected mothers.

All pregnant women should be symptomatically screened for TB at each visit. If active TB is excluded, and the woman has HIV, isoniazid preventive therapy should be offered.

If a pregnant woman answers "yes" to any of the screening questions, she should be evaluated for TB disease. The diagnostic process should be expedited because the earlier in pregnancy TB is diagnosed and treated, the better the maternal and neonatal outcomes.

If a pregnant woman is diagnosed as having TB, anti-TB treatment should be started immediately with the first line regimens. If the woman is co-infected with HIV and not already on ART, ART should be started within 8 weeks of starting treatment for TB.

6.5.3. Congenital and neonatal TB

6.5.3.1.Mode of transmission

Neonates with TB have either acquired the infection congenitally or soon after birth. Congenital TB refers to in-utero infection through haematogenous spread via the umbilical vein, or at the time of delivery through aspiration or ingestion of infected amniotic fluid or cervico-vaginal secretions. These infants usually present within the first week of life and have a poor prognosis. True congenital TB is rare but is likely being under-diagnosed. TB in young infants is more commonly a result of post-partum exposure to a close contact with infections TB, usually the mother. This may be referred to as "neonatal TB". TB is not transmitted through breast milk, although a breastfeeding infant is at increased risk of acquisition of TB through respiratory transmission if the mother has TB.

Clinically it neither possible nor necessary to distinguish between congenital TB and TB acquired after birth since the management is the same. The TB exposed neonate may be asymptomatic or symptomatic.

6.5.3.2. Diagnosis of neonatal TB

Onset of symptoms of TB is usually a few days to a few weeks post-partum. Symptoms and signs of TB are usually non-specific and include:

- Fever
- Lethargy, poor feeding
- "Neonatal sepsis" (disseminated TB)
- Irritability, seizures (meningitis)
- Prematurity, low birth weight (intrauterine growth restriction)
- Poor weight gain
- Respiratory distress, progressive non-resolving pneumonia
- Hepatosplenomegaly
- Abdominal distension with ascites
- Anaemia, thrombocytopaenia, disseminated intravascular coagulation

- Jaundice
- Ear discharge, skin pustules, paravertebral abscess
- Lymphadenopathy
- Chorioretinitis

The differential diagnosis of congenital TB includes neonatal sepsis from other bacterial causes and other congenital infections (toxoplasmosis, rubella, cytomegalovirus, herpes simplex virus, Epstein-Barr virus, syphilis and HIV). A poor response to antimicrobial therapy should alert the clinician to look for TB.
The most important clue to the diagnosis of TB in the new-born is a maternal history of TB or HIV infection. Critical points in the maternal history include:

- non-resolving pneumonia
- contact with an index case of TB
- recent commencement of anti-TB treatment

6.5.3.3. Management of neonates exposed to maternal TB

TB-exposed infants may initially appear well. Therefore, all new-borns that are known to be exposed to mothers with infections TB, or with symptoms consistent with congenital TB should be investigated for TB. The BCG vaccination routinely given to infants at birth should be delayed until possible TB disease or infection has been diagnosed and managed. If the infant is found to be HIV positive, BCG should be withheld completely.
Table 27 outlines the evaluation and management of infants exposed to maternal TB and symptomatic infants with no known TB exposure.

Table 27: Management of infants exposed to maternal TB and symptomatic infants with no known TB exposure

	TB-exposed and asymptomatic	TB-exposed and symptomatic	Symptomatic but no known TB exposure
Evaluation	• Thorough clinical examination • Morning naso-pharyngeal or gastric aspirates for TB bacteriology • Chest radiography • Mother: endometrial or placental sample for bacteriology and histology if • < 72h after delivery • Determine mother's HIV status if not known	• Thorough clinical examination • 3 x morning nasopharyngeal, gastric or tracheal (if intubated) aspirates for TB bacteriology • Chest radiography • Mother: endometrial or placental sample for bacteriology and histology if • <72h after delivery • TB bacteriology of ear swab, urine, abscess aspirate, LN biopsy (if lymphadenopathy) • Consider smear microscopy & • mycobacterial culture of CSF, liver biopsy, bone marrow aspirate • Determine mother's HIV status • if not known	• Thorough clinical examination • 3 morning naso-pharyngeal, gastric or tracheal (if intubated) aspirates for TB bacteriology • Chest radiography • Mother: endometrial or placental sample for bacteriology and histology if • <72h after delivery • Other relevant samples for TB bacteriology. • Determine mother's HIV status if not known

	TB-exposed and asymptomatic	TB-exposed and symptomatic	Symptomatic but no known TB exposure
Management	• DO NOT give BCG at birth • Give isoniazid TPT while awaiting results • If HIV-exposed, do HIV test and give CPT at 6 weeks • Follow infant regularly to ensure active TB does not develop • Start full treatment TB if bacteriology results positive • Start ART if HIV + • Continue to monitor clinical status • Give BCG 2 weeks after • completion of TPT unless infant HIV +	• DO NOT give BCG at birth • Start full TB treatment before all results of tests received if TB likely • If another cause found, give TPT • If HIV-exposed, do HIV test and give CPT at 6 weeks • Start ART if HIV+ • Monitor for weight gain / improvement in symptoms • Give BCG 2 weeks after completion of TB treatment unless infant HIV +	• DO NOT give BCG until TB has been ruled out • Treat as indicated • If HIV-exposed, do HIV test and give CPT at 6 weeks • Start ART if HIV + • Give BCG when decision made not to treat or 2 weeks after completion of TB treatment unless infant HIV +

In evaluating the infant, it is important to send all specimens for TB bacteriology (Xpert MTB/RIF and, if negative, mycobacterial culture). The mother's endometrial sample can be obtained through curettage. Where possible, the placenta should also be evaluated. This can be done through macroscopic inspection and, if suspicious areas are seen, histologic examination.

Congenital TB infection progresses almost universally and very quickly to TB disease. For this reason, full treatment is recommended even if the infant is asymptomatic.

Breast feeding is recommended for infants as it can be critical for child survival. TB is not transmitted through breast milk, and although anti-TB medicines are excreted into breast milk in small amounts, there is no evidence that they can induce drug resistance. The mother should wear a surgical mask when handling and feeding the infant. If the mother is known to have DR-TB, the clinician should consult the CCRC to discuss the management of the infant.

6.6. Prevention of TB in Children

6.6.1. BCG vaccination

Bacille Calmette-Guérin (BCG) is a live, attenuated Mycobacterium bovis vaccine given by intradermal injection administered soon after birth and which offers some protection to infants and young children against disseminated TB. The protective efficacy of BCG in young HIV-uninfected children against TB meningitis and miliary TB is estimated to be 73% and 77% respectively.

The policy in Namibia is to routinely administer BCG at birth to all infants unless the infant presents with symptomatic HIV infection. This policy takes into consideration that almost all HIV-infected infants are asymptomatic at birth and to not routinely vaccinate all infants at that time would pose significant risk to non-HIV infected infants in a setting of high TB prevalence. An exception to the above is the infant born
to a mother with suspected or confirmed TB. BCG should be withheld while screening for and managing active disease or infection in such infants *(see Section 6.5).*

6.6.1.1. BCG disease and BCG IRIS

Complications associated with BCG vaccination occur in some 1-2% of children and include injection-site lesions, adenitis and very rarely, disseminated disease. Disseminated disease, a condition associated with very high mortality, is generally estimated to occur in 5 infants per one million vaccinated. Before the HIV era, infants with disseminated BCG disease usually had rare congenital immunodeficiencies. The rate of disseminated disease in HIV-infected infants is much higher.

BCG disease can present any time after the vaccination and may also occur as part of Immune Reconstitution Inflammatory Syndrome (IRIS), soon after starting antiretroviral treatment. It may be classified as follows:

- Local - lesion at site of injection, including abscess or severe ulceration
- Regional - involvement of any regional lymph nodes (axillary or supraclavicular) or other regional lesions beyond site of injection. This may include enlargement, suppuration and fistula formation
- Distant - confirmed disease at one site other than the regional lymph nodes or local injection site such as pulmonary secretions, CSF, urine, bone and distant skin lesions
- Disseminated – disease occurring at two or more sites other than the regional or local site and/or at least one positive bone marrow or blood culture

BCG IRIS can be defined as BCG-associated local, regional, distant or disseminated disease that occurs in HIV-infected children generally within 3-6 months of initiating ART, irrespective of immunological proof of immune reconstitution. The classification, definitions and management of BCG IRIS is the same as for other BCG disease in HIV-infected infants.

All cases of BCG disease conforming to the above definitions should be officially reported as vaccine-related adverse events. Management of BCG disease will vary depending on the affected site and the HIV status of the child, as shown in Table 28 below. If BCG disease is suspected, consult a specialist. Medical treatment for BCG disease (assumed to be caused by M. bovis) should last a minimum of 9 months, with the following medicines:

- H 15-20 mg/kg/day
- R 20 mg/kg/day
- E 20-25 mg/kg/day
- Z 20-25 mg/kg/day (for 2 months or less if M.tb excluded)

Levofloxacin 7.5 -10 mg/kg/day

Dual infection with M. bovis (from the BCG) and M.tb may occur especially in countries with a high TB prevalence such as Namibia. Therefore, although M. Bovis is resistant to pyrazinamide, treatment should include pyrazinamide in the first two months because it is often difficult to confirm BCG disease and to rule out infection with M.tb or dual infection.

Table 28: Management of BCG disease

Site	HIV-negative	HIV-positive
Local or Regional	Observe. Consider therapeutic aspiration or excision if: • fluctuant node or abscess, • persistent, rapidly enlarging node, • fistula formation, or • presence of large injection site abscess	Consult a specialist (possible medical treatment) Consider therapeutic aspiration if node fluctuant. Follow-up 2-4 weekly. Consider excision biopsy if no improvement. Initiate ART if not yet commenced.
BCG IRIS (Local or Regional) with no suspected dissemination	Not applicable	Observe. Follow-up 2-4 weekly Continue ART Consult a specialist
Distant or Disseminated	Consult a specialist. Treat medically. Monitor for toxicity.	Consult a specialist. Treat medically. * Initiate ART if not yet commenced, taking into consideration potential medicine interactions. Monitor for toxicity.

6.6.1.2. BCG vaccination and HIV

HIV-infected infants who are routinely vaccinated with BCG at birth while still asymptomatic, and who later develop AIDS are at increased risk of developing disseminated BCG disease with an all-cause mortality of >75%. The risk is estimated to be 407 to 1300 per 100,000 HIV-infected infants. This represents a major increase in mortality over that in the general population.

For this reason, BCG vaccination would not generally be recommended for known HIV-infected infants. However, most HIV-exposed infants in Namibia have their first HIV test at 6 weeks of age, long after the routine BCG immunisation is currently given. Higher risk HIV-exposed infants have HIV testing at birth, however results may only be available 2 or more weeks later. Delaying routine BCG for HIV-exposed infants until confirming HIV status could result in many children developing severe forms of TB. The recommendation in Namibia is therefore for all new-borns to be given BCG vaccination unless they already show signs of HIV infection.

6.6.2. TB preventive therapy (TPT)

All children under five years old (whether HIV positive or negative) who have had contact with bacteriologically confirmed TB patients, including infants born to mothers with infectious TB disease, should have supervised isoniazid preventive therapy once active TB disease has been excluded. Health care workers should therefore screen all children exposed to bacteriologically confirmed pulmonary TB. Except in cases of perinatal exposure, screening for signs and symptoms of TB is generally thought to be sufficient.

In addition, any HIV-positive child in whom active TB has been excluded and who has never previously received TPT is eligible for TPT, whether there has been exposure to active TB or not.

Screening for active TB in children includes probing for presence of:

- Cough
- Poor weight gain (defined as reported weight loss, very low weight (weight-for-age < -3 z-score), underweight (weight-for-age < -2 z-score), confirmed weight loss >5% since last visit, or growth curve flattening),
- Fever, and
- Lymph node enlargement.

If the any of the above is present or suspected, investigation for TB and other diseases is required. This should include a thorough physical examination bacteriological testing, chest radiography and possibly a TST (*see Section 6.2.7).* All infants born to mothers with TB disease should be investigated thoroughly *(see above)* whether or not they have symptoms.

If the answer to all the screening questions is "No" then the child should be given a 6-month regimen of isoniazid TPT. The preferred TPT regimen is isoniazid 10 mg per kg (range 7-15 mg/kg, maximum 300mg) daily for 6 months. Table 29 shows a weight-banded dosage chart for isoniazid in children.

Table 29: Weight-banded dosage for isoniazid use in children

Weight range (kg)	Number of H100 tablets per dose daily	Dose (mg)
<5	½ tablet	50
5-9.9	1 tablet	100
10-13.9	1 ½ tablets	150
14-19.9	2 tablets	200
20-24.9	2 ½ tablets	250
≥25	3 tablets or one adult (300mg) tablet	300

Pyridoxine may be given along with isoniazid in HIV-infected children at risk of isoniazid associated neuropathy. A dose of 12.5 mg/day is suggested for children 5-11 years of age, and 25 mg/day for children ≥12 years. Pyridoxine is not routinely given to children under 5 years of age.

It is important to provide monthly follow up for all children started on TPT. This allows ongoing screening for TB disease as well as promotion of completion of 6 months of the preventive treatment. Child contacts on TPT may also be followed up according to the same schedule as the index case, if they live in the same household.

7. DRUG-RESISTANT TUBERCULOSIS

7.1. Overview

Development and spread of DR-TB must be prevented at all costs by implementing effective care and prevention strategies for TB. Patients with DR-TB should be managed by the district DR-TB teams in consultation with the NTLP's Central Clinical Review Council (CCRC), which reviews regimens intended for patients with DR-TB in Namibia and advise on other aspects of clinical care for patients with TB.

7.1.1. Definitions

Drug resistant tuberculosis refers to active TB caused by *mycobacterium tuberculosis b*acilli that are resistant to one or more anti-TB medicines.

The following different categories of DR-TB are of clinical significance:

- **Mono-resistance:** resistance to one first line anti-TB medicine.
- **Poly-drug resistance (PDR)**: resistance to more than one first line anti-TB medicine, other than both isoniazid and rifampicin.
- **Multidrug resistance (MDR):** resistance to isoniazid and rifampicin with or without resistance to other medicines.
- **Rifampicin resistance (RR):** resistance to rifampicin, with or without resistance to other medicines. This category includes MDR, rifampicin monoresistance, rifampicin polyresistance and those with rifampicin resistance detected by molecular methods such as Xpert MTB/RIF (where susceptibility to other medicines may be unknown).
- E**xtensively drug-resistance (XDR)**: resistance to any fluoroquinolone, and at least one of three injectable second-line medicines (capreomycin, kanamycin and amikacin), in addition to MDR.
- **Isoniazid resistance (Hr)**: resistance to isoniazid but confirmed rifampicin susceptible.

For purposes of recording and reporting, the following terms are also used:

- **Rifampicin mono-resistance (Rif-Mono)**: resistance to rifampicin alone, which is of special interest because patients with rifampicin monoresistance are managed the same way as those with MDR-TB. This classification is only applicable if the results of a full DST to first line medicines are available.
- **Rifampicin resistance by Xpert MTB/RIF (RifXpert):** resistance to rifampicin detected using Xpert MTB/RIF genotypic test. This is an interim classification pending further DST results to guide final classification. Based on results of resistance testing to other medicines, final classification should be rifampicin monoresistance, multidrug resistance, polydrug resistance or extensive drug resistance.

When placing patients on second-line anti-TB treatment, it should be documented whether or not the drug resistance is confirmed.

Confirmed drug resistance (usually MDR, XDR, PDR, Rif-Mono or RifXpert), is when there is bacteriological confirmation of the type of resistance.

Clinically diagnosed drug resistance (sometimes referred to as presumed drug resistance), is when patients are put on second line treatment without bacteriological confirmation of the

resistance they are being treated for. There may either be bacteriological confirmation of TB but no evidence of resistance, or no bacteriological confirmation of TB at all, as is frequently the case in young children.

7.2 Causes and development of DR-TB

7.2.1. Mutations

M.tb has the ability to undergo spontaneous mutations (changes to the bacterial DNA), resulting in bacilli that are resistant to any of the known anti-TB medicines. The probability of the occurrence of spontaneous mutants resistant to individual anti-TB medicines is as follows:

Isoniazid	:	1 in every 1,000,000 cell divisions
Rifampicin	:	1 in every 1,000,000,000 cell divisions
Streptomycin	:	1 in every 1,000,000 cell divisions
Ethambutol	:	1 in every 100,000 cell divisions
Pyrazinamide	:	1 in every 10,000 cell divisions

Spontaneous development of MDR-TB strains is extremely rare and would occur once in every 1015 cell

divisions (the product of the two probabilities of isoniazid and rifampicin mutation). The probability of the presence of resistant mutants in a person, therefore largely depends on the number of M.tb bacilli in a person's body. The lower the bacillary load, the lower the probability of harbouring naturally resistant mutants.

7.2.2. Selection by antimicrobial treatment

Treating a person with monotherapy while they have active TB and many millions of M.tb bacilli will almost invariably lead to resistance against this one medicine. This is due to selective killing of susceptible populations of bacteria, allowing those that are resistant to flourish.

All the M.tb bacilli in the body of a TB patient can be killed if a combination of at least 3 to 5 different and effective anti-TB medicines is given in the intensive phase when the bacterial population is still large; and at least 2 or 3 different effective anti-TB medicines are given in the continuation phase.

The notable exception is in the preventive therapy for a person with latent tuberculosis infection, where treatment with only one anti-TB medicine is effective and does not create drug-resistance. This is because the total numbers of bacteria are too few to support the probability of drug resistant mutants, and bacterial replication is not as prolific. This can only be effective if all candidates for preventive therapy are thoroughly screened to exclude active TB.

Development of resistance to anti-TB medicines in the community can be decreased by:

- Prescription of standardised and effective multi-drug regimens, including for patients with MDR- TB.
- Ensuring uninterrupted supply of medicines
- Ensuring that patients adhere to treatment.

Table 30: Factors that influence the emergence of DR-TB

Factors facilitating the emergence of DR-TB	Factors that prevent the emergence of DR-TB
Health care workers prescribe inadequate TB treatment regimen to patients with TB disease • Medicine dosage that is too low • Inappropriate combination of medicines • Treatment duration that is too short • Monotherapy	• Train health care workers on national TB treatment guidelines, • Supportive supervision to ensure adherence to guidelines • Ensuring uninterrupted supply and availability of anti-TB medicines
• Use of sub-standard anti-TB medicines	• Use of quality assured anti-TB medicines
• Patient does not take all TB medicines as prescribed • Inadequate intake of prescribed medicines • Inadequate combination of medicines • Treatment duration that is too short • Irregular and/or selective intake of medicines	• Use a combination of three measures: • Use of FDC medicines • DOT during TB treatment • Provide good patient support during the entire treatment using a patient-centred approach

7.2.3. Likelihood of DR-TB in a TB patient

The probability of DR-TB is much higher in a patient with TB who was a close contact of a patient with known DR-TB, or in a patient who relapses or fails after having been treated for TB. It is estimated that, in Namibia, about 5% of new patients and 11% of previously treated patients have resistance to rifampicin, while about 4% and 9% respectively have MDR. In addition, new TB patients with HIV are more likely to deteriorate rapidly if they have DR-TB which is not detected and treated early.

7.2.4. DR-TB and HIV

Evidence from some countries has shown an association between HIV infection and DR-TB. This is often caused by patients with DR-TB mixing with HIV infected patients in hospital wards and congregate settings. Good infection control measures in hospitals and other congregate settings are therefore important to protect other patients and health care workers, and especially those who are HIV positive, from nosocomial DR-TB infection.

7.3. Treatment of DR-TB

7.3.1. Use of second-line anti-TB medicines

There are limited options when it comes to anti-TB medicines, and it is important that second line medicines are used strictly according to these guidelines to prevent further resistance. Inappropriate use of these medicines may lead to the emergence of further resistance and create a growing number of potentially incurable patients, including XDR-TB. The table below shows the finite list of available anti-TB medicines for use in drug resistance.

Table 31: Groups of 2nd line anti-TB medicines

Group	Name	Abbreviation
A.	Levofloxacin OR Moxifloxacin Bedaquiline Linezolid	Lfx/Mfx Bdq Lzd
B.	Clofazimine Cycloserine OR Terizidone	Cfz Cs/Trd
C.	Ethambutol Delamanid Pyrazinamide Imipenem-cilastatin OR Meropenem Amikacin OR Streptomycin Ethionamide OR Prothionamide p-amino salicylic acid	E Dlm Z Imp-cln/Mpm Am/S Eto/Pto PAS

7.3.2. Eligibility criteria for treatment with second-line anti-TB medicines

The following patient categories are eligible for treatment with second-line anti-TB medicines:

- Confirmed resistance to rifampicin.
- Confirmed MDR-TB: Resistance to at least isoniazid (H) and rifampicin (R).
- Confirmed poly-drug resistant TB:
  - Resistance to isoniazid (H) and ethambutol (E) +/- streptomycin (susceptible to rifampicin).
  - Resistance to rifampicin and ethambutol +/- streptomycin (susceptible to isoniazid).

In the absence of bacteriological confirmation, the following are eligible for second line treatment after considering the circumstances around the patient:

- Young children under the age of five years who are diagnosed with active TB, with a close contact, especially a parent or caregiver who has bacteriologically confirmed DR-TB.
- Immunosuppressed patients diagnosed with active TB who are close contacts of known DR-TB patients.
- Relapse, failure or return after loss to follow-up on second-line treatment and smear or culture positive.

7.3.3. Second-line anti-TB treatment regimens

In Namibia, the regimens for DR-TB may be classified into two as follows

- Shorter DR-TB treatment regimen (STR) for eligible uncomplicated patients,
- Longer, individualised regimen for patients who are ineligible for the STR

Apart from the eligibility criteria set below, patients who are otherwise eligible for the STR may be offered the longer individualised regimen if they prefer, due to the absence of an injectable and possible higher efficacy in certain patient groups.

7.3.4. The shorter DR-TB treatment regimen

The STR represents a standardised approach to managing many of the uncomplicated cases of DR-TB, with reduced costs, reduced toxicity and potential for improved adherence and overall treatment outcomes. However, there should be careful selection of eligible patients for this 9-11-month regimen.

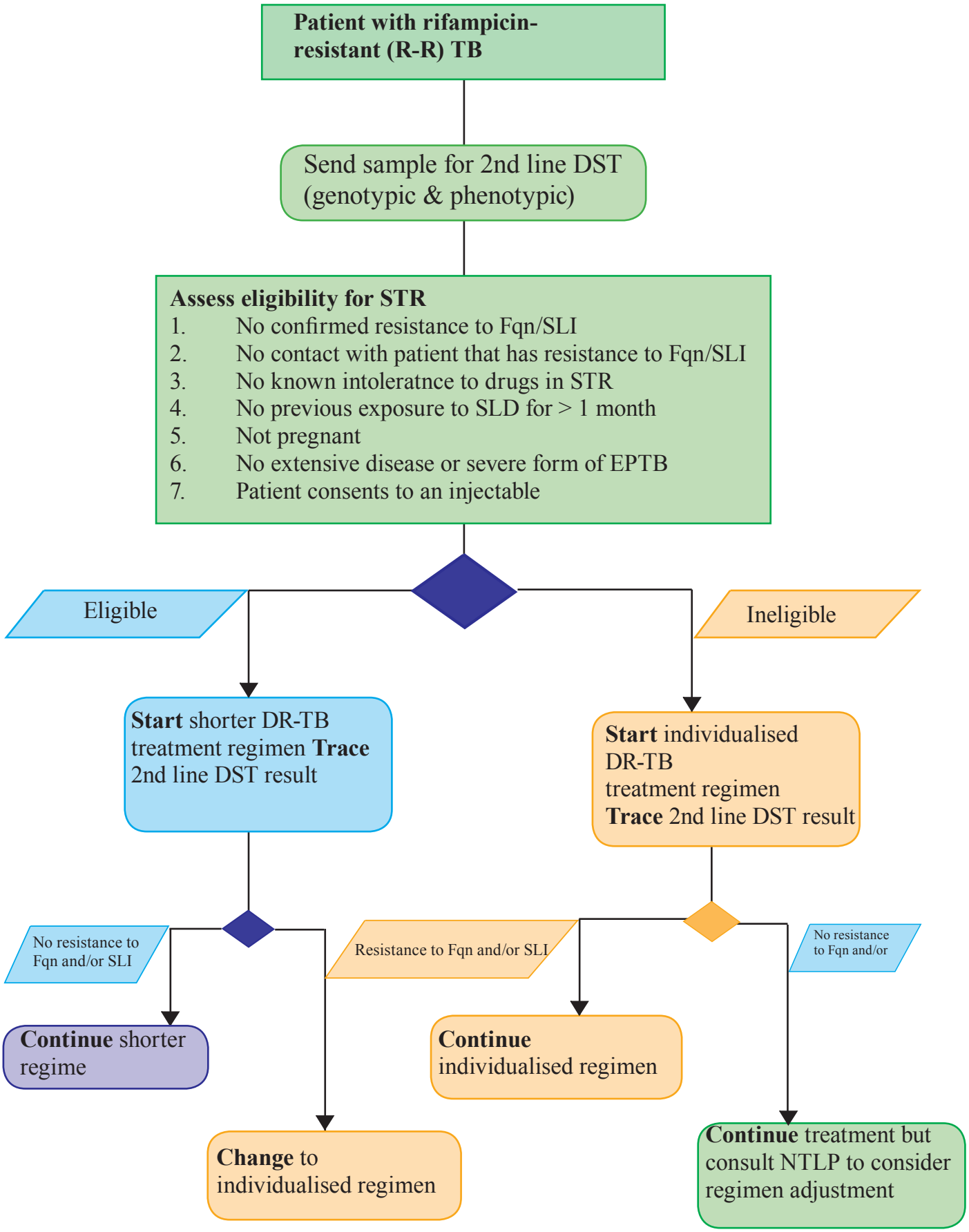
The following patients are considered eligible for the STR:

- Patients with rifampicin-resistant TB who have not been previously treated with second-line medicines and with low risk of, or with DST results excluding additional resistance to medicines in STR, particularly the fluoroquinolones and/or second-line injectables.
- Children and HIV infected patients with clinically diagnosed TB who have not been previously treated with SLD and with low risk of additional resistance to fluoroquinolones and/or second-line injectable who have been in close contact with patients with rifampicin-resistant TB.

Those that **should not** be considered for the STR include the following:

- Patients with confirmed resistance to second-line injectable or fluoroquinolone by either second line LPA or phenotypic DST.
- Patients with suspected resistance to second-line injectable or fluoroquinolone based on contact history.
- Pregnant women.
- Patients who have been treated with a DR-TB treatment regimen for more than a month.
- Patients with high risk of treatment failure, such as severe TB disease (e.g. multiple cavities, extensive parenchymal damage, bilateral disease).
- Patients with intolerance to any of the medicines in the STR.
- Patients with severe forms of extra-pulmonary TB such as meningitis, spinal TB or disseminated TB. Patients with TB pleural effusion or TB lymphadenitis may be considered for the STR.
- Patients who do not accept to receive an injectable and/or who prefer the longer individualised regimen

Figure 8: Decision flow-chart for DR-TB treatment initiation



Box 11: Notes on the Shorter DR-TB Treatment Regimen

The STR is given as a standardised regimen with little or no room for customisation with substitutions or switches during treatment.

- The intensive phase consists of amikacin[6], high dose moxifloxacin[7], ethionamide[8], clofazimine, pyrazinamide, ethambutol and high dose isoniazid daily for four months.
- The intensive phase may be extended to a maximum of six months if smear conversion occurs beyond the third month. If a sputum smear conversion is not achieved within four months kanamycin may be given thrice-weekly from the fifth month onwards, but the NTLP must be alerted.
- The continuation phase consists of high dose moxifloxacin, clofazimine, ethambutol and pyrazinamide for a fixed duration of five months;
- The shorter TB regimen is a standard regimen, so no customisations are allowable except for the ones described herein.
- If the patient remains smear positive and/or is still culture positive at 6 months, the patient will be declared as a treatment failure. A treatment failure declaration and a switch to an individualised treatment regimen may also be considered earlier in patients with clear lack of response (clinically, smear grading, culture).
- In case of diagnosis of any resistance to fluoroquinolone and/or second-line injectable or adverse effects requiring change of 2 medicines, the patient will be registered as treatment failure and an individualised regimen will be designed (not shorter regimen).
- The abbreviated notation for the STR is as follows:

4-6Am*-Mfx-Eto-Cfz-Z-Hh-E / 5 Mfx-Cfz-Z-E

(Am=Amikacin; Mfx=Moxifloxacin; Eto=Ethionamide; Cfz=Clofazimine; Z=Pyrazinamide; Hh= high-dose Isoniazid; E=Ethambutol).

* The 4-6 preceding the Am indicates the variable nature of the intensive phase between 4-6 months depending on smear and/or culture conversion.

[6] Kanamycin and capreomycin may only be used in the absence of amikacin and if streptomycin cannot be used

[7] Gatifloxacin is an acceptable alternative

[8] Prothionamide is an acceptable alternative

7.3.5. Individualised regimen for DR-TB

This regimen is for patients with rifampicin resistance in whom the STR cannot be used. These include all those with intolerance or resistance to injectable and/or fluoroquinolone (confirmed or suspected), those with extensive disease and those who have been treated with second line drugs before. As the name suggests, this regimen may take various forms depending on individual situation, but the principle of regimen design is the same. Individualised regimens should be approved by the NTLP, preferably based on a regimen proposed by the regional teams taking into account the treatment history and DST patterns (including from second line LPA). The regimen design should include the following steps, based on Table 31:

1. Select all three Group A medicines (bedaquiline, linezolid and either of moxifloxacin or levofloxacin). Confirmed or suspected resistance (from previous use) to one medicine means it cannot be used or, if used, should not be counted as one of the effective medicines.
2. Select the two Group B medicines (clofazimine and cycloserine). Confirmed or suspected resistance (from previous use) to one medicine means it cannot be used or, if used, should not be counted as one of the effective medicines.
3. If 4-5 effective medicines are not in the regimen yet, select medicines from Group C, with preference given to those that have not been taken by the patient before.

While the injection-free individualised regimen may not contain an intensive and continuation phase, bedaquiline and delamanid are normally administered for 6 months. Thereafter, the rest of the regimen may be continued with at least 3 effective medicines for a total of 20 months, or at least 15 months after culture conversion.

7.3.6. Regimens for other forms of DR-TB

7.3.6.1. Isoniazid resistant (Hr) TB

The term "isoniazid-resistant TB" is used to denote TB that has been confirmed to be isoniazid resistant, but rifampicin susceptible through genotypic (e.g. LPA) or phenotypic (culture and DST) means. Most cases will have isoniazid monoresistance and will be detected around the 2nd month of treatment for drug- susceptible TB when they are investigated for delayed sputum smear conversion. Once detected, susceptibility to rifampicin and fluoroquinolones should be confirmed (through LPA).

Cases should be treated with *rifampicin*, ethambutol, pyrazinamide and levofloxacin together for 6 months. The 6 months is counted from the time the levofloxacin is added to the regimen.

If low-level resistance is detected (with only the inhA mutation, but not the *kat*G mutation), high-dose isoniazid may be provided. To keep the pill burden low and promote good adherence, it is preferable to continue the HRZE fixed dose combination as inclusion of the isoniazid is unlikely to further harm the patient.

7.3.6.2. Polyresistant TB

Care should be taken to evaluate the medical history for possible resistance which may

have developed but may not be apparent from the laboratory results. As such, treatment for poly-drug resistant TB should never rely solely on DST results. Please refer to the *Guidelines for the Management of Drug-resistant Tuberculosis in Namibia for more information.*

Poly-drug resistance with resistance to rifampicin (susceptible to isoniazid) is treated with the same regimens as for MDR-TB, with isoniazid at a high dose included. Most of these patients will be eligible for the STR.

Similarly, rifampicin monoresistance should be treated with the same regimens as for MDR-TB, with isoniazid at a high dose included. Most of these patients will also be eligible for the STR.

Poly-drug resistance with susceptibility to rifampicin should be interpreted carefully, as many patients with DST results suggesting poly-drug resistance actually have MDR-TB. One therefore needs to also look at the treatment history. Where one method of testing (e.g. Xpert MTB/RIF) shows resistance and another shows susceptibility to rifampicin, it is wiser to accept the 'resistant' result. When in doubt, treat as MDR- TB and consult the NTLP. The regimen for confirmed PDR-TB will include rifampicin as follows:

- Initial phase: At least rifampicin, levofloxacin, pyrazinamide and amikacin (or streptomycin, if susceptible) and/or ethionamide and for at least 4-6 months and 2 consecutive negative cultures.
- Continuation phase: Rifampicin, levofloxacin, pyrazinamide and ethionamide for at least 6 months.

7.3.6.3. Regimens for extensively drug-resistant (XDR) TB

XDR-TB and MDR-TB with additional resistance to fluoroquinolones and/or second line injectables present a significant clinical challenge. Principles of regimen design remain as outlined for treating MDR- TB with individualised regimens. Treatment options are severely limited, and there should be adequate consultation before commencing treatment to minimise the risk of amplifying resistance.

7.4. Organisation of DR-TB treatment

7.4.1. Initiating treatment

Once a diagnosis of rifampicin resistant TB has been made, the local DR-TB team/ committee should meet and assess the eligibility to the STR. This includes completing the regimen eligibility checklist. The team will document the decision and propose treatment. Meanwhile the patient should be prepared as set out in Figure 9.

Preferably, the treatment decision should also be informed by the results of the second line LPA on susceptibility second-line injectable and fluoroquinolone. In the event that the LPA results are not yet available, the team should confirm that a specimen for LPA has indeed been received by the laboratory, and the go ahead with an interim treatment decision.

7.4.2. Hospital admission

While it is crucial for the long-term treatment support, hospitalisation should not be viewed as mandatory; the priority should be on ensuring delivery of a well supervised effective treatment regimen to the patient.

7.4.3. Discharging from the hospital

Hospitalised patients with DR-TB may only be discharged from the hospital to continue treatment on an ambulatory basis if the following criteria have been met:

1. The treating doctor, DTLC, social worker and nurse in charge must all agree that the patient can be discharged.
2. The DTLC must have arranged for assured continuation of DOT after discharge, through a community health worker.
3. The DOT provider (usually the community health worker or their supervisor) should have met the patient.
4. The medical team should have met the family or relatives to discuss DOT options as well as TBIC.
5. The social worker should certify that the home environment facilitates adherence to treatment.
6. The environmental health practitioner, nurse or other delegated member of the treating team must assess the patient's residence.
7. Documentation to the receiving health district or facility must be completed.

7.4.4. Ambulatory treatment

Ambulatory treatment is generally the preferred method of treatment delivery, as there is widespread evidence of superior or similar treatment outcomes when compared to hospitalisation-based models of care. The risk of continued transmission of DR-TB in the community after initiating the correct treatment is very low, as long as patients continue to take treatment. Most transmission of TB would probably have occurred before the patient was diagnosed and put on the correct treatment. The decision on a management model should be individualised and patient-centred, but all necessary logistics should be put in place to ensure daily administration of the injectable, should ambulatory treatment be chosen during the initial phase of the STR.

The following models can be considered:

- *Ambulatory throughout treatment:* Initiate treatment on an ambulatory basis with no hospitalisation unless there is a drastic change in circumstances.
- *Ambulatory after stabilisation:* Hospitalise to initiate treatment, then discharge to ambulatory care once clinical condition has stabilised, and major symptoms have been controlled.
- *Ambulatory after sputum conversion:* Hospitalise until no longer infectious, as determined by smear and/or culture conversion.
- *Ambulatory in continuation phase:* Hospitalise for the whole duration of the initial/ injectable phase.
- *Hospitalised throughout treatment (no ambulatory treatment):* For some patients,

social factors may prevent successful ambulatory treatment, therefore they can be hospitalised for the whole duration of treatment, unless there is a change in circumstance.

7.4.5. Use of multi-disciplinary teams

Managing DR-TB should always involve teamwork. Facilities managing patients with DR-TB should have a committee responsible for planning and overseeing the management of these patients. These teams should include, among others, the following:

- The district tuberculosis and leprosy coordinator (DTLC),
- At least two medical officers (preferably including a senior medical officer),
- Pharmacist or pharmacy assistant,
- Nurse-in-charge of the TB ward,
- Social worker,
- DOT worker (field supervisor, coordinator or training officer),
- Clinical mentor, where available,
- Rehabilitation professional (physiotherapist, occupational therapist or medical rehabilitation worker),
- Other clinical and management staff depending on need and availability,

7.4.6. Close contacts of DR-TB patients

A list of close contacts should be compiled for each patient, recorded in the DR-TB patient booklet, and those contacts screened for active TB using the symptom screening questionnaire. Close contacts with symptoms or other suggestive features should undergo bacteriological testing, and chest X-ray if warranted. Contacts diagnosed with active TB should be investigated for DR-TB.

Contacts with active TB may be treated according to their DST pattern, but it is always important to consider the full DST pattern of the index or source case, particularly 2nd line DST, in designing a regimen. Immunosuppressed or paediatric close contacts with clinically diagnosed active TB may be considered for an empirical DR-TB treatment regimen.

If active TB has been excluded, close contacts should be monitored at least every 6 months over 2 years and advised to return whenever symptoms occur. Although there is currently no universally recommended chemo-prophylactic regimen with second-line anti-TB medicines, for some contacts such as very young children chemo-prophylaxis may be considered in consultation with specialists. Contact investigation is also an opportunity to offer the contacts an HIV test and comprehensive care, if positive.

7.4.7. Managing loss to follow up on second line anti-TB treatment

All efforts have to be made to prevent patients from interrupting anti-TB treatment through the provision of patient-centred and patient-friendly services, and by ensuring family members and treatment supporters are fully involved in the care and support of the patient.

Patients should be assisted to fully understand why their DR-TB treatment should not be interrupted and the consequences of poor adherence, i.e. poorer prognosis, higher risk of failure, putting family members and contacts at risk, and having to receive more complicated and longer treatments. In particular, poorly managed second-line treatment may result in XDR-TB. It is sometimes justifiable not to treat habitual interrupters, due to the risk of amplifying resistance and spreading resistant strains.

For patients returning after interrupting treatment, smear microscopy should be performed immediately to determine potential infectiousness.

Table 32: Management of patients returning after loss to follow up from second-line TB treatment

Patient characteristics	Management
Patient has had 4 weeks or longer of 2nd line TB treatment, and is sputum-smear (DM) positive	• Collect one sputum specimen for C/DST, including DST to 2nd line anti-TB medicines, • Give intensive counselling to the patient and his family members / treatment supporters, • Discuss the case with the local DR-TB management team, and determine social eligibility to continue second-line anti-TB treatment, • Record previous outcome as 'Lost to follow-up', • Re-register the patient as 'previously treated with 2nd line medicines', and • **Re-start** second line anti-TB treatment in consultation with the DR-TB team and adjust regimen as appropriate when DST results become available. • **Do not give the STR.**
Patient has taken 4 weeks or longer of 2nd line TB treatment, and is sputum- smear (DM) negative	• collect one sputum specimen for C/DST, to all first-line and second line anti- TB medicines, and • Continue the previous DR-TB treatment regimen from where it was interrupted If culture is positive: • Give a final treatment outcome as Lost follow up from previous regimen, • Re-register the patient for the new treatment episode, and • **Re-start** second line anti-TB treatment in consultation with the DR-TB team and adjust regimen as appropriate when DST results become available. • **Do not give the** STR. If culture is negative: • Continue previous DR-TB regimen from where it was interrupted, • Delete earlier "lost to follow up" outcome and update the report, and • Final treatment outcome will be determined from the current regimen
Patient has taken less than 4 weeks of DR-TB treatment and is sputum- smear positive on return	Restart the MDR-TB regimen which the patient interrupted.
Patient has taken less than 4 weeks of DR-TB treatment and is sputum-smear negative on return	Restart the MDR-TB regimen which the patient interrupted.

Figure 9: Management of DR-TB patients during the intensive phase

PRE-TREATMENT ASSESSMENT

1. Go through the Regimen Eligibility checklist to determine the most appropriate regimen.
2. Discuss implications of treatment with the patient and family, and sign the DR-TB treatment consent form.
3. Conduct a full clinical assessment and record the weight and height.
4. Collect baseline sputum for direct microscopy, and culture and DST.
5. Perform HIV counselling and testing if HIV status is unknown.
6. Collect blood for FBC, U&E, LFT, TSH, CD4 count (if HIV+ and not on ART) or HIV viral load (if on ART >3 months); and urine for pregnancy test (women).
7. Perform baseline chest X-ray examination.
8. Perform baseline ECG and measure the QTc interval.
9. Conduct social assessment to address potential psychosocial barriers to treatment (e.g. care of children, rent, occupation, etc).
10. Perform baseline audiometry, especially if an injectable is being considered.
11. Ensure adequate documentation (DR-TB register; DR-TB patient booklet; electronic tools)
12. Screen (and document) all close contacts for symptoms. Where appropriate, follow up with sputum Xpert MTB/RIF, culture/DST, chest X-ray, and/or other relevant investigations. Children under 5 years will require special attention.
13. Consult the NTLP where necessary.

INITIAL PHASE OF TREATMENT

1. The patient must be on 5 or more anti-TB medicines.
2. Daily DOT by a health care worker is mandatory.
3. Perform and document weekly side effects screening.
4. Collect monthly sputum for DM and culture, and document results.
5. Collect blood for monthly U&E and document serum potassium and estimated creatinine clearance rate. In patients at risk of renal impairment, this should be performed weekly.
6. Perform monthly audiometry if on an injectable and document the audiogram.
7. Perform monthly FBC and document the serum haemoglobin if on linezolid
8. Perform monthly ECG monitoring and document QT interval.
9. Repeat Chest X-ray at 4 months then at 9 months for those on STR and every 6 months f or those on individualised regimen.
10. Arrange for regular reviews by the social worker.
11. Arrange for regular reviews by the rehabilitation professional (occupational therapist, physiotherapist, medical rehabilitation worker).

Figure 10: Management of DR-TB patients during the continuation phase

PREREQUISITES FOR CHANGING FROM INTENSIVE PHASE TO CONTINUATION PHASE

1. The patient should have completed at least
   - 4-6 months of the intensive phase if on the STR
   - 6 months or more of initial phase if on the individualised regimen.
2. The patient should have completed at least 2 months of initial phase treatment after culture conversion. This may be waivered in cases of EPTB or in whom it is not practical to obtain monthly specimens for cultures.
3. The patient should have clinically improved.

CONTINUATION PHASE OF TREATMENT

1. Duration of continuation phase is
   - At least 5 months if on STR
   - At least 12 months if on individualised regimen
2. The patient must be on at least 3 anti-TB medicines.
3. Patient swallows medicine daily under direct observation by a designated and accountable DOT supporter, preferably a CHW.
4. Weekly supplies of medicines are provided to the DOT supporter by the health facility nurse.
5. The patient is reviewed monthly by the TB focal nurse and is assessed for side effects.
6. Sputum samples for culture and DM are collected every month and the patient is reviewed by the doctor.

DISCHARGING THE PATIENT FROM TREATMENT

1. The local DR TB committee including the doctor and the DTLC must agree on the outcome
2. The following final treatment outcome classifications may be assigned: *Cured, Treatment completed, Lost to follow-up, Failed, Died* (NB: Please note that *'transferred-out'* should not be routinely assigned as a final outcome)
3. All documentation (including electronic forms) should be updated accordingly
4. Arrangements should be made to follow up the patient 3-monthly for one year, with symptom screening as well as sputum DM and culture.

Figure 11: Pre-requisites for ambulatory treatment

PRE-REQUISITES FOR AMBULATORY TREATMENT OR DISCHARGING THE PATIENT FROM HOSPITAL

1. The treating doctor, DTLC, social worker, nurse in charge and a community TB care supervisor must all agree that the patient can be managed from their usual place of residence.
2. The DTLC and the CBTBC supervisor must have arranged for assured continuation of DOT after discharge.
3. The DOT provider should have met the patient and his/her family.
4. The medical team should have met the family or relatives to discuss DOT options as well as TBIC.
5. The social worker should certify that the home environment facilitates adherence to treatment.
6. The environmental health practitioner, IC nurse or DOT provider must assess the patient's residence.
7. Documentation to the receiving health district or facility must be completed.
8. As a minimum, the treating team should ensure that the patient has a clear understanding of the following:
   - ✓ How often the medicines are to be taken,
   - ✓ How often the DOT supporter collects medicine from the health facility,
   - ✓ When and where the next appointment,
   - ✓ When and why the next sputum sample is needed,
   - ✓ What to do if there is a problem,
   - ✓ How to prevent transmission at home and in the community, and
   - ✓ How long the treatment is expected to last.

7.5. Recording and reporting for DR-TB

7.5.1. Registration of patients

Any patient with DR-TB must be classified in terms of anatomical site, history of previous treatment, bacteriological status including drug resistance and HIV status. Once a diagnosis of DR-TB is confirmed, or if a decision to commence empirical treatment for DR-TB is made (based on a clinical diagnosis), this and other relevant information is then recorded in the following tools:

1. District Drug-resistant TB register,
2. Drug-resistant TB Patient Booklet (also known as the DR-TB Treatment Card), and
3. Electronic TB Manager (*eTB Manager*).

More information on classification, recording and reporting may be found in Chapter 5, Chapter 12 and in the *Guidelines for the Management of Drug Resistant Tuberculosis in Namibia.*

7.5.2. Outcome classification

All patients should be assigned a final outcome when they complete the treatment regimen and/or at the end of the cohort reporting period. This outcome should be registered in the DR-TB treatment register, on the Patient Booklet and the relevant electronic symptoms. Any of the following final outcomes may be assigned:

- **Cured:** Treatment completed as recommended by the national policy without evidence of failure and three (3) or more consecutive cultures taken at least 30 days apart are negative after the intensive phase.
- **Treatment completed:** Treatment completed as recommended by the national policy without evidence of failure but no record that three (3) or more consecutive cultures taken at least 30 days apart are negative after the intensive phase.
- **Treatment failed:** Treatment terminated or need for permanent regimen change of at least two anti-TB medicines because of:
    - Lack of conversion by the end of intensive phase; or
    - Bacteriological reversion in the continuation phase after the conversion to negative; or
    - Evidence of additional acquired resistance to fluoroquinolones or second-line injectable medicines; or
    - Adverse drug reactions (ADRs).
- **Died:** A patient who dies of any cause during the course of treatment.
- **Lost to follow-up:** A patient whose treatment was interrupted for two or more consecutive months.
- **Not evaluated:** A patient for whom no treatment outcome is assigned (this includes cases ‘transferred out' to another treatment unit and whose treatment outcome is unknown).
- **Treatment success:** The sum of Cured and Treatment Completed.

A patient who has been transferred to another reporting and recording unit and for whom the treatment outcome is unknown may have the outcome assigned as not evaluated. Patients who

have transferred in should have their outcomes reported back to the treatment unit at which they were originally registered.

7.5.3. Cohort analysis

All patients should be analysed in two different cohorts:

- **The treatment cohort** includes only patients who start treatment. It is defined by the date of start of treatment.
- **The diagnostic cohort** includes patients diagnosed with DR-TB (identified in the DST Register by date of diagnosis or DST result) during a specific period.

8. TUBERCULOSIS AND HIV

8.1. TB and HIV

8.1.1. Background

Since the 1990s, many countries including Namibia experienced a large increase of TB cases due to the escalating HIV epidemic. This happens in two ways:

- Reactivation of latent TB infection to TB disease, due to HIV-related immunodeficiency. This was the main driving force behind the current TB epidemic.
- Rapid progression from recent TB infection to TB disease. Just as recently infected children are more likely to progress rapidly from TB infection to active disease (primary progressive TB), some PLHIV are also more likely to experience the same. In the absence of HIV infection, the lifetime risk of developing TB disease is approximately 10%. However, a person with both HIV and TB infection has a 5-10% risk of developing TB disease annually. In 2017, 36% of TB patients in Namibia were HIV infected.

TB is the leading cause of death in PLHIV. Failure to promptly diagnose and treat TB in PL-HIV contributes to premature mortality and transmission of TB in the community.

8.1.2. TB/HIV collaboration

The goal of TB/HIV collaborative activities is to reduce the burden of TB and HIV in populations affected by both diseases by expanding the scope of TB and HIV programmes. The objectives underlying this goal are outlined in *Table 33:*

Table 33: TB/HIV collaborative activities

A. Establish and strengthen mechanism for delivering integrated TB/HIV services
A.1 Set up and strengthen a coordinating body for collaborative TB/HIV activities functional at all levels
A.2. Determine HIV prevalence among TB patients and TB prevalence among people living with HIV
A.3. Carry out joint TB/HIV planning to integrate the delivery of TB and HIV services
A.4. Monitor and Evaluate collaborative TB/HIV activities
B. Reduce the burden of TB in people living with HIV and initiate early antiretroviral therapy
B.1 Intensify TB case finding and ensure higher quality anti-TB treatment
B.2 Initiate TB prevention with preventive therapy and early antiretroviral therapy
B.3. Ensure control of TB infection in health care facilities and congregate settings
A. Reduce the burden of HIV in patients with presumptive and diagnosed TB
C.1. Provide HIV testing and counselling to patients with presumptive and diagnosed TB
C.2. Provide HIV prevention intervention for patient with presumptive and diagnosed TB
C.3. Provide co-trimoxazole preventive therapy for TB patients living with HIV
C.4. Ensure HIV prevention, treatment and care for TB patients living with HIV
C.5. Provide antiretroviral therapy to TB patients living with HIV

Collaborative services provide the framework towards achieving full TB/HIV integration, which should be the aim particularly at primary and secondary care level. A fully integrated TB/HIV service facilitates implementation of a 'one-stop shop' approach, ensuring comprehensive care for HIV infected TB patients under one roof.

8.1.3. Mechanism for HIV/TB collaboration

8.1.3.1. Set up and strengthen a coordinating body for collaborative TB/HIV activities functional at all levels:

This means that there should be an enunciated mechanism through which the management of TB/HIV patients is addressed at national, regional, district and facility levels; as well as within the community health services. Regions and districts should therefore ensure that there is a forum for discussion of TB/HIV issues.

8.1.3.2. Conduct surveillance of HIV prevalence among TB patients and TB prevalence among PLHIV

All TB patients should be offered HIV testing and counselling as early as possible. Patients who initially decline HIV testing should still be offered the chance to be tested at subsequent visits. Data on HIV status of TB patients should be reported on a quarterly basis; aggregation of these data provides very useful information for programme planning and implementation. Similarly, settings caring for PLHIV should monitor the occurrence of active TB among PLHIV through routine screening.

8.1.3.3. Joint TB/HIV planning

Joint planning and coordinated management are particularly important for:
Joint resource mobilisation, both financial and human, at all levels.
Capacity building, including training.
TB/HIV advocacy, communication and social mobilisation.
Enhancing community involvement in collaborative TB/HIV activities through support groups for PLHIV and community-based organisations. Communities can be mobilised to advocate for resources and help implement collaborative TB/HIV activities.
Operational research to inform national policy and strategy development, taking account of cultural, geographical and resource diversity.

8.1.3.4. Monitoring and evaluation of collaborative TB/HIV activities

This provides the means to assess quality, effectiveness, coverage and delivery of collaborative TB/HIV activities. Indicators are integrated within the monitoring and evaluation system of National Strategic Framework (NSF) for HIV and Medium-Term Plan (MTP) for tuberculosis and leprosy.

8.1.4. Reducing the burden of TB in people living with HIV and initiate early antiretroviral therapy

8.1.4.1. Intensified TB case-finding (ICF)

ICF involves screening for symptoms and signs of TB in settings where HIV infected people seek care. All HIV infected persons should be screened for TB at every opportunity. Referral mechanisms and
communication and education to clients and staff need to be implemented routinely. The following sites should be considered important for intensified TB case-finding:

- HIV counselling and testing (HCT) centres,
- HIV care clinics,
- medical wards,
- antenatal clinics,
- out-patient departments,
- correctional facilities, and
- other congregate settings.

The following TB screening questions should be asked to all PLHIV visiting any of the above sites:

Box 12: Screening questions for active TB

Yes	Symptoms to ask about	No
	Are you coughing?	
	Are you experiencing recent weight loss (for children, poor weight gain is equivalent to weight loss in an adult)?	
	Are you having drenching night sweats?	
	Are you having a fever?	
	Do you have swellings in the neck, armpits or groin (Lymph node enlargement)?	

Clients who answer "Yes" to any of these questions should be investigated for active TB. If already on TPT, it should be stopped until TB is ruled out. If the client is a current contact, a new course of TPT should be given, regardless previous course/s.

8.1.4.2. TB preventive therapy (TPT)

Also referred to as treatment for latent TB infection, TPT is very effective in preventing active TB in individuals who have latent infection with *M.tb.* Persons who qualify for TPT include:

- HIV-positive persons in whom active TB has been excluded,
- Young children who are close contacts of patients with infectious TB, and
- Close contacts of a smear-positive TB patient who have medical conditions that suppress the immune system, such as Hodgkin's disease, leukaemia, or diabetes mellitus, or who have been on immunosuppressive therapy like chronic steroids or cancer chemotherapy.

Individuals with both HIV infection and latent TB infection have a 5-10% *annual* risk of developing active TB, compared to HIV-negative individuals whose *lifetime* risk is only 10%. A course of isoniazid TPT taken daily reduces the risk of active TB in HIV-infected patients by at least 60% in both adult and children and in combination with ART, the risk reduction exceeds 80%. Although Isoniazid TPT is the most widely used form of TPT, other regimens are also efficacious (*see Section 9.3.4*).
The safety of isoniazid TPT has been well established, including in pregnancy and in children. When administered correctly, isoniazid TPT has not been associated with development of isoniazid resistance. Risks of isoniazid TPT include isoniazid-induced hepatitis, peripheral neuropathy and inadequate treatment of persons with active TB with the potential development of isoniazid resistance. Following the strict criteria for TPT eligibility, along with proper monitoring and follow-up, will minimise these risks.

8.1.4.2.1. Eligibility criteria for TPT in PLHIV

The individual must:

- Be healthy (TPT should not be given to patients who are unwell, particularly where there is no explanation for the illness),
- Have no symptoms or signs of TB – **current cough, fever, weight loss, night sweats, enlarged lymph nodes**, or fatigue, blood in sputum, chest pain, diarrhoea, shortness of breath and loss of appetite,
- Have no history of alcoholism,
- Have no history of active liver disease, liver insufficiency, or jaundice,
- Have no history of hypersensitivity to isoniazid (if isoniazid TPT is being considered),
- Have no history of exfoliative dermatitis, and
- Be motivated for TPT after being educated about the benefits, possible side-effects and risks.

8.1.4.2.2. Precautions

Persons starting isoniazid TPT must be warned about possible side-effects:

- Isoniazid-induced hepatitis will present with nausea and vomiting accompanied by passing dark urine and/or generalised itching.
- Peripheral neuropathy manifests as burning, numbness or tingling in feet and/or hands.

If any of these symptoms develop, the patient must stop taking TPT and report immediately to the nearest health facility for assessment and management. Health-care workers should always check clients for signs and symptoms of hepatitis, neuropathy and skin itching when they come to collect TPT.

The recommended duration of isoniazid TPT for PLHIV in Namibia is 9 months, for both HIV infected adults and children.

- In an adult, dosage of isoniazid is 10 mg/kg bodyweight (up to a maximum of 300mg/per day) given daily.
- For adults, pyridoxine 25 mg daily is administered with the INH to decrease the risk of peripheral neuropathy
- In children the dosage of isoniazid is 10-15mg/kg body weight.
- Pyridoxine may be given at a dose of 12,5mg for ages 5-11years and 25mg from 12 years and above.

Alternative TPT regimens applicable for PLHIV include the following (*see also Section 9.3.4*):

- 36H – Isoniazid alone for at least 36 months
- 3HP – Isoniazid (weekly) and rifapentine (weekly) for 3 months

High risks of reinfection and high susceptibility for TB infection and disease in HIV-positive persons may limit the long-term efficacy of TPT. PLHIV who are current contacts of an active TB patient should be given a repeat course of TPT when active TB disease has been ruled out.

8.1.3.1.1. When to initiate TPT

Same day ART and TPT initiation is recommended for newly diagnosed PLHIV who are eligible. All PLHIV on ART and not yet on TPT should be screened for TB at every visit and initiated on TPT as soon as eligible. PLHIV who have successfully completed TB treatment should be assessed for TPT, with the aim of initiating a TPT course immediately after completing the full course of TB treatment. All details of the person receiving TPT must be recorded as required in the TPT/IPT register and the TPT/IPT identity card or other patient-held record. TPT status should also be recorded in the HIV patient care booklet (if HIV positive). An outcome should be given to all patients registered for TPT.

8.1.5. Reducing the burden of HIV in TB patients

8.1.5.1. Provide HIV testing and counselling:

All TB patients should be offered HIV counselling and testing (PICT) at every opportunity because of the following benefits:

- CPT and ART in HIV-infected patients have been shown to improve morbidity and prolong survival following successful TB treatment, but cannot be provided if the TB patient's HIV status remains unknown;
- Knowing one's HIV status is important for individual behavioural change, preparing for the future, and reducing stigma. This applies to each TB patient as well as the health-care worker providing care.

8.1.5.2. HIV prevention for patients with TB

Comprehensive HIV prevention messages and tools for reducing risk of transmission should be offered to all TB patients, including provision of condoms, IEC materials and services and screening for sexually transmitted infections.

Where appropriate, pre-exposure prophylaxis (PrEP) should be offered to eligible patients with TB and a substantive risk of developing HIV. PrEP is administered through daily intake of oral tenofovir/emtricitabine (TDF/FTC 300mg/200mg) or tenofovir/lamivudine (TDF/3TC 300mg/300mg).

- PrEP may be used intermittently during periods of perceived HIV acquisition risk, rather than continually and lifelong, as is the case with antiretroviral treatment.
- It takes 7 days of daily PrEP to reach adequate anal/rectal tissue levels and up to 20 days of daily dosing to achieve protective vaginal tissue.
- During this period, other protective precautions must be used, such as abstinence or condoms.
- PrEP medications should be continued for 28 days after the last potential HIV exposure in those wanting to stop taking PrEP.

See the *National Guidelines for Antiretroviral Therapy 2016*, for further information on PrEP.

8.1.5.3. Co-trimoxazole preventive therapy

Cotrimoxazole preventive therapy (CPT) reduces morbidity and mortality in HIV-infected TB patients through the prevention of opportunistic infections such as pneumocystis pneumonia, other pneumonias, diarrhoea, malaria and toxoplasmosis. Cotrimoxazole 960mg daily should be started (or continued, if already taking it) concurrently with TB treatment in PLHIV Patients who are allergic to sulphur medicines should take dapsone 100 mg daily instead until the CD4 > 200 on two consecutive tests performed 6 months apart. Lifelong CPT is recommended for any patient who initiates CPT unless there is a contra-indication or clinical indication for discontinuation.

8.1.5.4. Anti-retroviral therapy in patients with TB

Antiretroviral therapy (ART) improves survival in HIV-positive patients. In addition, ART reduces TB rates by up to 90% at an individual level and by 60% at a population level, as well as reducing TB recurrence rates by 50%. ART should be initiated for all PLHIV with active TB regardless of CD4 cell count. In PLHIV who are not already on ART, TB treatment should be started first, followed by ART as soon as possible and no later than 8 weeks of starting TB treatment.

8.1.5.4.1. What ART regimens to start

The recommended first-line ART regimens for TB patients are those that contain efavirenz (EFV), since interactions with anti-TB medicines are minimal when compared to other non-nucleoside reverse transcriptase inhibitors. Rifampicin, an important component of TB treatment, interacts with many medicines, including many ARVs. Rifampicin decreases blood levels of protease inhibitors by approximately 80%, nevirapine by 30-50%, and efavirenz by 25%. This effect on efavirenz at 600mg per day in adults is not clinically significant and efavirenz can be used with rifampicin. At standard doses, efavirenz (EFV) in combination with tenofovir-emtricitabine or tenofovir-lamivudine (TDF/FTC (or 3TC) is effective (see the box below). Alternatively, the integrase inhibitor dolutegravir (DTG) can be used) in combination with tenofovir-emtricitabine or tenofovir-lamivudine at double the usual daily dolutegravir dose. The usual adult dose is 50mg once daily, but in patients receiving rifampicin the dose is 50mg twice daily.

8.1.5.4.2. When to start ART

All patients with HIV should generally be on ART. If diagnosed with TB while not on ART, TB treatment should be commenced first and ART subsequently commenced, as soon as possible and within 8 weeks. HIV-positive patients with profound immunosuppression (e.g. CD4 cell counts less than 50 cells/mm3) should receive ART immediately within the first 2 weeks of initiating TB treatment.

The rationale for starting ART soon after TB diagnosis is that case-fatality among TB/HIV patients occurs mainly in the first 2 months of TB treatment. However, early initiation of ART means an increased number of tablets for the patient, which may discourage treatment adherence. There is also increased risk of adverse effects, medicine interactions and IRIS.

Box 13: Recommended ART regimens for adults with TB in Namibia

Preferred 1st line ART regimen:

TDF + FTC (or 3TC) + EFV (at 600mg once daily)

Alternate 1st line ART regimen:

TDF + FTC (or 3TC) + DTG (at 50mg twice daily)

F**or PLHIV on a boosted PI regimen**:

- Option 1 Substitute rifampicin in the TB treatment with rifabutin
- Option 2; If Rifabutin is unavailable or contraindicated, maintain rifampicin in TB treatment and use PI based regimen super boosted with ritonavir:
- TDF or AZT + 3TC with LPV/r 400mg+ritonavir 400 mg BD (LPV/RTV)
- *Note: ATV/r is contraindicated in patients with TB/HIV co-infection*

For patients in whom EFV and super-boosted PI cannot be used

Triple nucleoside regimens: tenofovir (TDF) + emtricitabine (FTC) (or lamivudine (3TC)) + zidovudine (AZT)

NB: These combinations are short term and the patient should be switched to standard regimen two weeks after completing Rifampicin-based TB treatment

8.1.5.4.3. Immune Reconstitution Inflammatory Syndrome (IRIS)

The Immune Reconstitution Inflammatory Syndrome (IRIS) is a spectrum of clinical signs and symptoms resulting from the restored ability to mount an inflammatory response associated with immune recovery. It can present with signs and symptoms of a previously subclinical and unrecognised opportunistic infection, as a paradoxical worsening several weeks into therapy, or as an autoimmune disease such as Grave's disease (hyperthyroidism) in the context of immune recovery on ART.

Mild to moderate IRIS is relatively common in patients with TB started on ART; it has been reported in up to one-third of patients in some studies. However, it is relatively rare in its severe forms. The syndrome can present as fever, enlarging lymph nodes, worsening pulmonary infiltrates, or exacerbation of inflammatory changes at other sites.

IRIS generally presents within 3 months of starting ART and is more common when CD4 cell count is low (<50 cells/mm3). Most cases resolve without intervention and ART can be safely continued. In severe cases steroids are beneficial; in very severe cases temporary discontinuation of ART with continuation of TB therapy may be required.

IRIS is a diagnosis of exclusion. Patients with advanced AIDS may show clinical deterioration for a number of other reasons. New opportunistic infections or previously subclinical infections may be unmasked following immune reconstitution and cause clinical worsening. IRIS can also be confused with TB treatment failure. In addition, HIV-positive TB patients may be demonstrating progression of TB disease due to drug-resistance.

8.1.5.4.4. Organisation of combined TB treatment and ART in the co-infected patient

In order to minimise the burden to the patient it is advisable that the patient receives both anti-TB and ARV medicines from one health facility nearest to his home or workplace. ARV medicine collection should therefore be made accessible in health facilities that offer TB therapy, and vice versa.

When DOT is being given outside the health facility, ideally the ARV "treatment supporter" should also be the "DOT supporter", directly observing ingestion of both the ARVs and anti-TB medicines.

8.2. Other Comorbidities

8.2.3. TB and Diabetes

8.2.3.1. Background

Diabetes weakens the immune system and is estimated to be directly responsible for 15% of all TB cases worldwide. Diabetics are 3-5 times more likely to develop active TB if infected than non-diabetics. On the other hand, patients with concurrent diabetes may suffer worse TB treatment outcomes, a higher rate of relapse following anti-TB treatment, and a higher risk of death from TB than patients with TB alone. Patients with poorly controlled diabetes or those on insulin are at even higher risk of getting sick with TB. In addition,

- TB can impair glucose tolerance, increasing the risk of developing diabetes,
- Diabetes may worsen the clinical course of TB; the likelihood of death or relapse is significantly higher if a TB patient also has diabetes
- TB impairs glycaemic control in people with diabetes.

Individuals with both conditions thus require careful clinical management.

8.2.3.2. Establishing a mechanism for collaborating

Joint coordination should be established at regional and district levels (through appropriate fora that represent all relevant stakeholders. There should be joint planning for TB activities and those for non- communicable diseases, including diabetes. There should be a system established for surveillance of TB among diabetes patients in settings with where these diabetics are managed. Similarly, there should be a system of surveillance for diabetes in TB care settings. TB status should be recorded in tools that document diabetes while diabetes status is recorded in tools for TB.

8.2.3.3. Detecting and managing TB in patients with diabetes

Individuals with diabetes should be screened for active TB disease at diagnosis and at every contact with a HCW. Individuals with positive TB symptoms should be investigated further for TB. Treatment with anti- TB medicines should be promptly initiated for those with a confirmed TB diagnosis.

TB diagnosis and treatment services should be incorporated in health facilities treating patients with diabetes. In the event that such services are not available, a bi-directional referral system should be put in place so that patients suspected of having TB are promptly referred for TB diagnosis and treatment. Health care facilities that are managing and treating diabetes patients should have a TB infection control plan in place that outlines strategies for reducing TB transmission.

8.2.3.4. Reducing the burden of diabetes in TB patients

It is ideal to screen patients with TB for diabetes at the start of their TB treatment. Management of diabetes in TB patients should be provided in line with existing management guidelines. The recommended screening procedure for diabetes in TB patients includes the following steps:

1. Ask all TB patients at diagnosis if they have diabetes mellitus.
    - If yes, check if they are receiving appropriate management, perform a fasting blood glucose and manage accordingly;
    - If they do not have known diabetes, proceed to step 2.
2. Perform a random blood glucose test using plasma (from a blood sample sent to the laboratory) or a rapid glucose test using a portable glucometer.
    - If the blood glucose level is less than 6.1mmol/l, then the diabetes risk is low; the patient has screened negative.
    - If the blood glucose is more than 6.1mmol/l, further testing is required, go to the step 3.
3. Perform a fasting blood sugar or a glycosylated haemoglobin (HbA1c) test
    - The patient may be considered diabetic if the fasting blood sugar is equal to or more than 7.0mmol/l or the HbA1c is more than 6.5%. Such patients will require active management of diabetes.

Patients who test positive using the procedures outlined above should be referred to a medical officer for management of diabetes mellitus.

8.2.4. TB and alcohol

8.2.4.1. Background

Alcohol abuse is common in settings where TB is common and may increase the risk of TB threefold. Alcohol abuse is also a strong risk factor for poor TB treatment adherence. Alcohol use disorder (alcoholism) is often a common co-morbidity among TB patients and is defined as a situation when alcohol use is results in physical or mental health problems, including addiction. It is preferable that patients abstain or significantly restrict their alcohol intake while on treatment for TB.

Systematic screening for alcohol abuse should be part of the baseline assessment for all adolescent and adult TB patients in order to identify those with alcohol problem and refer for appropriate interventions. Screening and diagnosis of other mental health problems may also be warranted. Failure to identify alcoholism may result in a patient being loss to follow-up or failing to take required medication due to uncontrolled interference by the alcohol habit.

8.2.4.2. Screening for alcoholism

Individuals at risk may be screened using a simple four-question 'CAGE' (Cut, Annoyed, Guilty and Eye opener) questionnaire. Patients are asked the following questions.

1. Have you ever felt you needed to Cut down on your drinking?
2. Have people Annoyed you by criticizing your drinking?
3. Have you ever felt Guilty about drinking?
4. Have you ever felt you needed a drink first thing in the morning (Eye-opener) to steady your nerves or to get rid of a hangover?

A 'Yes' response to any one of the questions should alert the HCW to the potential for alcohol dependency. Such a patient should be monitored closely. If signs of alcoholism emerge during treatment, or if the patient starts interrupting treatment, they should be referred for assessment by a social worker and possible treatment for alcoholism.
A 'Yes' response to 2 or more questions indicates a high likelihood of alcoholism, and such a patient must be referred for further assessment by a social worker and treatment for alcoholism.

8.2.4.3. Managing alcoholism

Alcoholism should be viewed as a disease, with both medical and psychological facets. Management includes correct identification, psychotherapy techniques and social support. For some cases, medical treatment for alcoholism is warranted. All cases of alcoholism should be assessed by a social worker and, if severe, referred to a clinical psychologist.

8.2.5. TB and tobacco smoking

8.2.5.1. Background

Passive or active exposure to tobacco smoking is significantly associated with TB infection and disease. Active smoking is significantly associated with recurrent TB and TB mortality. This is in addition to the deleterious risks of smoking on cardiovascular disease, lung disease and malignancies. Any patient who smokes tobacco products should be encouraged to stop because of the long-term consequences of smoking.

8.2.5.2. Screening for tobacco smoking

All TB patients should be asked about their tobacco use. TB care settings should have IEC materials on the dangers of tobacco smoking and encouraging patients to stop smoking.

8.2.5.3. Managing tobacco smoking

All patients who smoke should be advised to stop. Those with severe nicotine addiction may be referred to a social worker for counselling. Medical treatment may be considered in some patients who desire to stop but psychotherapy techniques are failing.

8.2.6. TB and malnutrition

8.2.6.1. Background

Poor nutrition is often prevalent among communities where TB is common, mainly because both TB and malnutrition are associated with poverty. Malnutrition is common in patients with TB and is often under- recognised. Malnutrition can weaken the immune system and is a risk factor for progression from TB infection to active TB disease. On the other hand, TB can lead to malnutrition. Undernutrition at time of TB diagnosis is a predictor of increased risk of death and TB relapse. In children, malnutrition itself should be considered one of the signs of active TB, and may be present without any other "typical" signs and symptoms of TB.
While TB treatment can help normalise nutritional status, many TB patients are still malnourished at the end of TB treatment and require assistance with nutritional supplementation.

While TB treatment can help normalise nutritional status, many TB patients are still malnourished at the end of TB treatment and require assistance with nutritional supplementation.

8.2.6.2. Screening for malnutrition

When managing children, the child growth chart must always be examined. Faltering growth or poor weight gain and low weight for age should lead to suspicion of malnutrition. Low weight for height (wasting) and/or pitting oedema should point to acute malnutrition. Stunting, or low height for age indicates chronic malnutrition, where the child may not look obviously malnourished and may have a well-proportioned body. For adults and older children, a body mass index and mid-upper-arm circumference (MUAC) should be measured. Those with low MUAC will require repeated measurements at subsequent visits.

8.2.6.3. Managing malnutrition

Nutritional assessment and counselling should be part of the TB treatment package. IEC materials advising on adequate nutrition should be available in TB treatment settings. High protein and high calorie diets are generally recommended in the early phase of TB treatment, and they assist with weight recovery. Multivitamin and mineral supplements may also be provided to all those at risk of malnutrition.

9. TUBERCULOSIS INFECTION CONTROL AND PREVENTION

9.1. Introduction

Prevention of TB can be viewed at 3 levels:

- Preventing TB infection (primary prevention)
- Preventing TB disease (secondary prevention)
- Preventing TB morbidity and mortality (tertiary prevention).

Current approaches to TB care can be considered as providing a combination of primary and tertiary prevention. Early diagnosis and adequate treatment of infectious TB patients contributes to preventing transmission of TB infection to uninfected persons in the community, and also prevents TB death and disability in those patients who already have the disease. This chapter will focus on prevention of TB infection in health facilities.

9.2. Preventing TB infection: Tuberculosis infection control (TB-IC)

Administrative, environmental and personal respiratory protection should be implemented according to the *National Tuberculosis Infection Control Guidelines.* All health care facilities should have infection control plans outlining the implementation of TB-IC in the specific facilities:

9.2.3. The TB infection control plan

Every health facility and care setting should have a written infection control plan that outlines a protocol for the prompt recognition, separation, investigation and referral of patients with suspected or confirmed TB. Areas which should be prioritised in the health facilities include areas where diagnosed or undiagnosed TB patients are found, such as out-patient screening areas, waiting areas in medical outpatient departments, HIV care clinics, medical wards, TB clinics and TB wards.

The TBIC plan should be developed after conducting a facility risk assessment for each unit/ department/ward.

9.2.4. The hierarchy of TB infection control

Airborne infection control measures, including TBIC, are meant to complement the standard precautions and other transmission-based precautions. TBIC is based on a hierarchy of controls, namely administrative controls, environmental controls, and personal protection. Each control operates at a different level in the TB transmission process:

- **Administrative control measures** reduce the chances of exposure for both HCWs and uninfected patients. Interventions here are the most effective at reducing transmission of TB;
- **Environmental control measures** reduce the concentration of droplet nuclei in the air, but are less effective than administrative controls;
- **Personal protective equipment** protects HCWs from inhaling infectious droplet nuclei in areas where the concentration of droplet nuclei cannot be adequately reduced by administrative and environmental controls. Although most visible, personal protective equipment will not offer the same level of protection as the environmental and administrative controls.

The table below summarises the measures for each level of controls. More information on TB-IC measures can be obtained in the *Tuberculosis Infection Control Guidelines.*

Table 34: The hierarchy of TB infection control

	Administrative controls
1	Promptly identify persons with symptoms suggestive of TB (triage)
2	Separate or isolate potentially infectious patients
3	Control the spread of pathogens (cough etiquette and respiratory hygiene).
4	Minimise time spent in health care facilities by persons with symptoms suggestive of TB
5	Provide a package of HIV prevention, TB screening, (preventive) treatment and care intervention for staff.
	Environmental controls
6	Ensure sufficient air exchange and control airflow direction by using natural and mechanical ventilation system.
7	Inactive TB bacilli in suspended droplet nuclei by using upper-room air UVGI units, in combination with slow-moving ceiling fans
	Personal protective equipment
8	Reduce the inhalation of infectious particles by breathing air which has been effectively filtered to 0.3 microns with a particulate respirator.

9.2.5. The FAST Strategy

FAST is a practical approach to TB infection control which prioritises rapidly diagnosing and putting patients on effective treatment. ***FAST***, which stands for **F**inding TB cases **A**ctively, **S**eparating safely and **T**reating effectively, focuses HCWs on the most important infection control practices. It capitalises on the effectiveness of the administrative control measures.

- **Finding TB patients**
  The most infectious TB patients are the undiagnosed cases who often transmit bacilli in the clinics and waiting areas, infecting HCWs, patients and other users of the facility. The HCWs have to find, diagnose and effectively treat these patients in order to stop the further transmission of TB.
- **Actively finding cases**
  Undiagnosed patients with TB may present themselves to the health facility for reasons unrelated to TB, and they may not mention cough, fever, night sweats or weight loss-symptoms which may or may not be associated with pulmonary TB. The FAST approach encourages health facilities to Thus, all patients who

visit health facilities must be screened for TB symptoms, particularly cough. In addition, anyone who is observed coughing, even if they may not have self-reported, is considered as a candidate for TB investigation.

- **Separating safely**
  While waiting for evaluation, patients identified by cough monitors should be separated temporary from other patients in a well-ventilated area to prevent further spread of TB. The sputum must be collected outdoors and away from others, and tested promptly for TB as recommended in these guidelines
- **Treating effectively**
  Prompt and effective treatment is an important step in preventing transmission of TB. Patients become non-infectious soon after starting effective TB treatment.

9.3. Other methods of preventing TB disease

9.3.3. Vaccination

A TB vaccine that offers longstanding, consistent protection against all forms of TB disease to infants, children and adults, including MTB infected and HIV infected persons is currently unavailable. The BCG vaccine remains the only TB vaccine that is widely known and has been used globally. However, the efficacy of BCG is variable when it comes to protecting against TB infection and TB disease; and its effectiveness is less than previously thought. The BCG vaccine does significantly reduce the occurrence of miliary/disseminated forms of TB and TB meningitis in children (tertiary prevention). BCG should be offered once at birth to all new-borns (*see Chapter 6*).

9.3.4. Tuberculosis preventive therapy

Tuberculosis preventive therapy refers to use of medications to prevent patients with latent TB infection developing active TB. It is also referred to as treatment of latent TB infection (LTBI). TPT must be prioritised for PLHIV and close contacts of infectious TB patients. Isoniazid preventive therapy (TB-IPT) is the most widely used form of TPT. TB-IPT is generally given for 6 months in HIV-uninfected contacts and longer for PLHIV.

Other forms of TB preventive therapy not currently in routine use in Namibia include the following:

- 36H – Isoniazid alone for at least 36 months for PLHIV
- 3HP – Isoniazid (weekly) and rifapentine (weekly) for 3 months
- 3HR – Isoniazid and rifampicin for 3 months
- 4R – Rifampicin alone for 4 months

These other regimens may be considered in consultation with the NTLP or with other expert advice.

9.4. Prevention of TB among health care workers

9.4.3. Background

People working in health-care settings are at a vastly increased risk of suffering

TB infection and disease. This includes nurses, doctors, porters, cleaners, caterers, counsellors, clerks as well as volunteers. HCWs with HIV are at a particularly high risk of rapid progression to TB disease if they become infected or re-infected due to exposure to *M.tb* in the facility.

9.4.4. Screening of health care workers

HCWs should be screened regularly for active TB. Health facility managers should spearhead the process of screening their staff and maintain a log of those screened in a confidential staff screening register. Screening for TB is recommended at entry into the service, annually and on exit or transfer from a facility. In addition, HCWs should be encouraged to know their HIV status and, if negative, get tested regularly.

Symptom screening for TB is generally recommended (asking for cough, fever, weight loss, night sweats and lymph node enlargement) supplemented by chest X-rays if facilities are available. Staff with symptoms and/or X-ray abnormalities should have sputum collected for TB investigation (with at least Xpert MTB/RIF). More information and tools on HCW screening can be found in the *National Tuberculosis Infection Control Guidelines*.

9.4.5. Training of health care workers

All health facility staff, including support staff, should be included in training programmes on TB-IC, and receive regular refresher trainings. Following TB-IC measures recommended in these guidelines should reduce the time that persons with undiagnosed TB spend in the health facility and should improve ventilation and thus facilitate dilution of M.tb bacilli in the environment.

9.4.6. Special situations

HCWs who are known to be HIV-positive, diabetics or on prolonged immunosuppressive medications (including corticosteroids) should be offered TPT and must be assigned to areas with lower risk for occupational exposure to TB. Although staff are not forced or coerced to disclose their HIV status, they should be made to understand that it is in their best interest to discuss their status with the facility manager. Facility managers on the other hand should ensure that private information is treated confidentially and under no circumstances should one staff member's HIV status be discussed without permission of the affected member, except where emergency treatment is required.

9.4.7. Managing staff with TB

HCWs who are diagnosed with TB should receive treatment according to these guidelines and should have a DOT supporter (preferably another HCW) ensuring they adhere. Those with bacterial confirmation of disease must be offered sick leave and only return to work when they are no longer infectious. This is after having

a) Taken treatment for at least 2 weeks, except for those being treated for DR-TB.

b) Clinically improved.

c) Had one negative follow-up sputum smear examination result.

At no point during treatment should a HCW be made to feel stigmatised or unfairly treated. It is of outmost importance to demonstrate exemplary treatment of staff with TB to guide the corporate sector and other government departments.

10. COMMUNITY ENGAGEMENT FOR TUBERCULOSIS

10.1. Introduction

Community engagement is defined as the process of working collaboratively with and through communities to address issues affecting their well-being. Community-based TB activities are conducted outside the premises of formal health facilities (e.g. hospitals, health centres and clinics) in community-based structures (e.g. schools, DOT points, places of worship, congregate settings) and homesteads.

TB is diagnosed in clinics and hospitals, but it thrives in the community. Action in the community is therefore essential in a country's efforts against TB. It is also important to link community action on TB with the MoHSS so that the efforts of the health system are extended and reach as many people as possible. Non-governmental organisations (NGOs) and civil society organisations (CSO) can use the ENGAGE-TB approach to support their work within communities by, among others:

- Finding more people who might have TB and linking them to TB services;
- Supporting people to start and complete TB treatment;
- Raising community awareness on prevention and increasing demand for TB testing, treatment and support;
- Advocating for better access to TB diagnostics, treatment and care; and
- Advocating for policy changes to facilitate greater access to services, for example task-shifting that allows nurses, CHWs or community volunteers to perform sputum collection and provide DOT in the community.

10.2. Harnessing the power of communities to end TB

Despite the best efforts of health systems, difficulty in accessing health facilities is one of the reasons people with TB may not be diagnosed and can also have a negative impact on treatment adherence. Community organizations and networks have a unique ability to interact with affected communities and react quickly to community needs and issues, while engaging with affected and key populations. Access to healthcare can be affected by social and political factors (such as stigma and discrimination, and the availability of cross-border services for migrants), and economic barriers (for example, the cost of transport). The role of community engagement in contributing to TB prevention, diagnosis and treatment, especially where people with TB have poor access to formal health services, is therefore well recognized. Community based TB activities cover a wide range of activities contributing to prevention, diagnosis, improved treatment adherence and care that positively influence the outcomes of drug-sensitive, drug-resistant and HIV- associated TB. The activities include community mobilisation to promote effective communication and participation among community members to generate demand for TB prevention, diagnosis, treatment and care services.

10.3. Activities performed through community engagement

Community health workers and community volunteers carry out the following community-

based TB activities, with priorities depending on the national agenda as well as regional arrangements. The following list of activities should form the basic package for community engagement.

- **Screening** - Screening for TB and TB-related morbidity (including HIV counselling and testing, diabetes), contact investigation, sputum collection and transport, including through home visits
- **Referral** - Referring for diagnosis of TB and related diseases, linking with clinics, transport support and facilitation, accompaniment, use of referral forms
- Treatment adherence support - Home visits, adherence counselling, stigma reduction, treatment support, home-based care
- **Social and livelihood support**- Insurance schemes, nutrition support and supplementation, voluntary savings and loans, inclusive markets and income generation
- **Awareness creation and stigma reduction** - Awareness-raising, behaviour change communications, community mobilisation and reduction of stigma and discrimination.

More community engagement activities are outlined in *Table 35.*

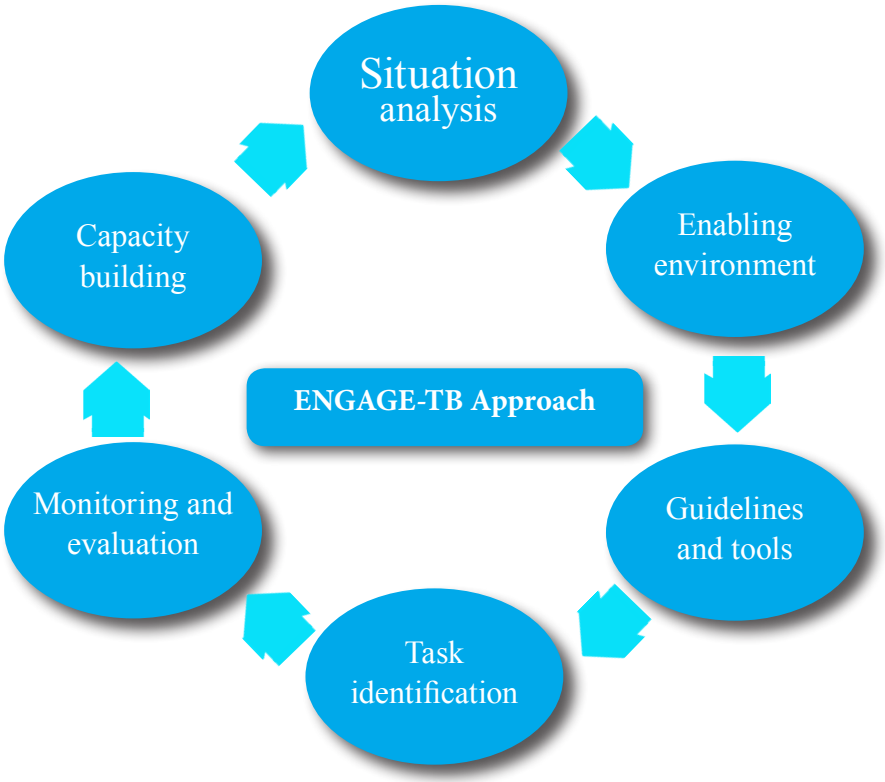
Table 35: Community engagement activities

Activity	Examples
Prevention	Awareness-raising, information, education and communication (IEC), behaviour change communication (BCC), infection control, training of providers, community mobilization.
Diagnosis	Screening, home visits and contact tracing, sputum collection and transport, providers training.
Referral	Linking with clinics referring for diagnosis of TB and related diseases, transport support and facilitation, accompaniment, referral forms, providers training.
Treatment adherence support	Home-based patient support, adherence counselling, stigma reduction, pill counting, training of providers, home-based care and support.
Social and livelihood support	Cash transfers/transport enablers, insurance schemes, nutrition support and supplementation, voluntary savings and loans, inclusive markets that extend choices and opportunities to the poor, training of providers, income generation.
Stigma reduction	Community theatre/drama groups, testimonials, patient/peer support groups, community champions, sensitizing and training facility and CHWs/Community Health Committee (CHC) and leaders.
Advocacy	Ensuring availability of resources, training of providers, addressing governance and policy issues, working with community leaders

10.4. Implementing the ENGAGE-TB approach

Implementing the ENGAGE-TB approach goes through 6 steps (see Figure 12), which must be continuously adjusted to suit local needs

Figure 12: The ENGAGE TB Approach cycle



- Conducting a **situational analysis** involves collection of basic data, qualitative information, reviewing the main actors and factors and analysing strengths, weaknesses, opportunities and threats (SWOT).
- Establishing an **enabling environment** includes having supportive policies, simple operating procedures, having the NGO/CSO coordinating body and participate in regular meetings with NTLP and other government stakeholders.
- Developing or adapting **guidelines and tools** comes next and must be in line with national guidelines, standardized tools, and reporting requirements from both the funders and national programmes.
- **Task identification** would include mapping out roles and responsibilities following wide consultation. NGOs/CSOs should offer as wide a range of community-based TB services as possible for example, prevention, screening, referral, treatment support, and advocacy so as to minimise referral of patients between agencies and organisations.
- **Capacity building includes mobilising and ensuring** human resources, financial resources, physical assets, management and leadership, systems and processes are prepared for the activities of TB care and prevention
- **Monitoring and evaluation** should be in line with national requirements. In particular, focus should be given to numbers of community members referred for TB diagnosis and care and treatment outcomes of those TB patients who receive support from the NGO/CSO.

10.5. Integrating drug-resistant TB into community-based work

CHWs, whether working under NGOs or working for the MoHSS, can integrate drug-resistant TB into their community-based work in many ways. It is particularly important for this to happen when working with high-risk populations such as PLHIV, the very poor, people living in congested environments (informal settlements and it comes to DR-TB, CHWs should at least participate in the following aspects of managing patients with DR-TB:

- **Contact investigation:** Engaging members of the community to assist health care workers in identifying contacts of DR-TB patients, screening them and linking those that need further assessment. This work can be especially useful in difficult settings where geographical and socioeconomic barriers prevent proper identification and follow up of contacts.
- **Providing treatment support:** Ensuring patients being treated for DR-TB are given support to take their medicines and complete their treatment. Family members and community-based volunteers and workers can be trained as treatment supporters by NGOs and other CSOs. Patients can also be provided with nutritional and psychosocial support, if needed.
- **Preventing the transmission of drug-resistant TB:** Encouraging simple behaviour change on cough etiquette, such as covering the mouth and nose when coughing and sneezing to limit the spread of infected sputum particles and thus reducing the risk to others of being infected. NGOs and other CSOs could spread this message using various social communication media.

10.6. Ambulatory DOT

Once a patient has been started on treatment, s/he should be allocated to a CHW and referred to the health facility nearest their place of residence. This health facility will be responsible for the provision of TB medicines, monitoring the patient's treatment (by sputum-smears), as well as tracing the patient should s/he miss an appointment. Preferably, the CHW facilitates DOT and coordinates medicine pickup and sputum collection at the health facility. The CHW, from discussion with the patient, may select from any of the following DOT options, which are applicable for either drug resistant or drug susceptible TB (see also Chapter 5):

- **Health facility-based DOT**, where a patient takes all or most of their doses at an established health facility, supervised by a trained health worker.
- **Community health worker-assisted DOT,** where the CHW takes direct responsibility for observing the patient take treatment at a convenient location.
- **Workplace DOT,** where the CHW or nurse indirectly supervises treatment through someone at the patient's workplace, preferably a supervisor or health office.
- **Guardian-based DOT,** where someone within the patient's family or social services observes treatment intake.

Unsupported self-administration of anti-TB medicines is generally discouraged. In practice, a mixture of various DOT options may be utilised in the course of one patient's treatment, but the CHW must be there to give consistency to the support given to the patient. Whenever guardian-based DOT is used, there should be evidence of regular supervision of guardians by the CHW.

10.7. Advocacy, communication and social mobilisation (ACSM) for tuberculosis

10.7.3. Introduction

ACSM stands for advocacy, communication and social mobilisation.

10.7.3.1. Advocacy

Advocacy seeks to ensure that national and local governments remain strongly committed to implementing TB care and prevention policies. Advocacy often focuses on influencing policy-makers, funders and international decision-making bodies through a variety of channels. The different types of advocacy are:

- *Policy advocacy:* informs senior politicians and administrators how an issue will affect the country, and outlines actions to take to improve laws and policies
- *Programme advocacy:* targets opinion leaders at the community level on the need for local action
- *Media advocacy:* validates the relevance of a subject, puts issues on the public agenda, and encourages the media to cover TB-related topics regularly and in a responsible manner so as to raise awareness of possible solutions and problems.

10.7.3.2. Communication

Health communication is "the art and technique of informing, influencing, and motivating individual, institutional, and public audiences about important health issues and is part of health promotion. Behaviour-change communication (BCC) aims to change knowledge, attitudes and practices among various groups of people. It frequently informs the public on the different health services and the latest medical interventions available. Effective BCC and messages need to convey more than just the medical facts as, on their own, these facts do not necessarily motivate people to visit a TB clinic or complete their treatment. The messages should explore the reasons why people do or do not take action on the information they receive, and then focus on changing the actual behaviour by addressing the identified causes.

BCC creates an environment through which affected communities can discuss, debate, organise and communicate their own perspectives on TB. It aims to change behaviour – such as persuading people with symptoms to seek treatment – and to foster social change, supporting processes in the community or elsewhere to spark debate that may shift social mores and/or eliminate barriers to behavioural change.

Always remember the golden rule whenever you communicate: **RUTH** (**R**espect, **U**nderstanding, **T**rust and **H**onesty).

10.7.3.3. Social mobilisation

Social mobilisation brings together community members and other stakeholders to strengthen community participation for sustainability and self-reliance. Social mobilisation generates dialogue, negotiation and consensus among a range of players that includes decision-makers, the media, NGOs, opinion leaders, policy-makers, the private sector, professional associations, congregate settings, TB-patient networks and religious groups. At the heart of social mobilisation is the need

to involve people who are either living with active TB or have suffered from it at some time in the past. Empowering TB patients and the affected community helps to achieve timely diagnosis and treatment completion, especially among families of TB patients

Although distinct from one another, advocacy, communication and social mobilisation (ACSM) are most effective when used together. ACSM activities should therefore be developed in parallel and not separately.

10.7.4. TB control challenges that can be addressed through ACSM

The following challenges associated with TB care and prevention are well known and acknowledged:

- Delayed detection and treatment,
- Lack of access to TB treatment,
- Difficulty in completing treatment,
- Stigma and discrimination that can prevent people from seeking care and diagnosis,
- Lack of knowledge and information about TB, leading to stigma, discrimination and delayed diagnosis and/or treatment,
- Misunderstandings and myths surrounding TB, including the belief that it is "untreatable",
- Failure to understand the link between TB and HIV, with the view that having TB means one has HIV, and
- Weak political support for TB programmes.

Key messages to be consistently provided to the communities are:

a) TB is curable even in HIV-infected people,
b) TB treatment is free of charge at public health facilities in Namibia, and
c) TB patients should complete their treatment course.

10.8. Patient education

10.8.3. General patient education

Good patient education is the cornerstone for achieving high treatment success rate by preventing patients from treatment interruption and default. Since patients have different cultural and educational backgrounds, patient education can only be effective if each patient is approached as an individual, each with his own specific problems and background. This requires specific skills and the right attitude from the educator, and most importantly, sufficient time.

For anti-TB chemotherapy to be successfully completed, each patient must understand what the treatment entails: different medicines, duration, possible side-effects, importance of completing the treatment and taking every medicine as prescribed, and the possibility of HIV co-infection and treatment. The educator must verify that the patient has fully understood the message by asking the patient and the DOT supporter to explain the information in his/their own words.

Many different people can and should provide TB education: nurses, doctors, pharmacists, CHWs, counsellors, peer educators, social workers, DOT supporters and others. Care must be taken that their messages are consistent and mutually re-enforcing.

The following approach is considered desirable to achieve full understanding by the patient and his/her DOT supporter:

- Intensive high-quality patient education and organisation of ambulatory DOT should occur during the period of hospital admission.
- The DTLC and TB nurse in collaboration with the CHWs have the overall responsibility of ensuring that each TB patient and treatment supporter is properly informed and fully understands the implications of TB disease and treatment.
- To maximise effectiveness of patient education and information, relevant educational materials should be available and provided to each patient and DOT supporter:
- The TB patient card includes a patient education checklist to guide the TB educator(s) and ensure that all important aspects of information are covered and understood by the patient.
- Other educational materials can support the process of patient education, such as flip charts and videos.

Box 14: Patient education

It is much more cost-effective to invest time in patient education and support than in tracing of patients who interrupt their treatment.

10.8.4. Principles of patient education

Every educator should bear in mind that the diagnosis of TB is often perceived as a shock by the patient. The first IEC session might therefore focus on acceptance of the diagnosis;

- Assume that each patient with TB will be worried about having HIV (unless they already know their status), and that not addressing this represents a missed opportunity for HIV prevention and patient management.
- Education is a dialogue, not a lecture.
- Involve patient companions (family, relatives and friends) in the education sessions to maximise retention and reinforcement.
- Always encourage the patient and his/her companions or treatment supporter to ask questions.
- The educator should try to put himself in the position of the patient.
- Allow sufficient time for each session.
- Use several approaches repeating the same messages: group discussion, individual dialogue, leaflets, flip-charts etc.
- Provide the patient and his companions with information leaflets in the language they can read and understand.
- Verify that the patient has understood the message(s) by asking him/her to repeat the message(s) in his/her own words
- Try to avoid providing too much information at the same time.
- Be prepared to repeat education sessions at another time

10.8.5. What each patient and his/her DOT supporter needs to know

10.8.5.1. During initial (admission) phase:

- TB is curable, if treatment is taken as prescribed.
- TB treatment is available free of charge at any government or mission health facility.
- TB is an infectious disease that is transmitted from one person to another by coughing, and appropriate cough hygiene reduces transmission.
- The patient may already have infected other people who may also develop TB. The patient should therefore encourage other people with whom s/he is in close contact to have themselves checked for TB disease now and when become ill or display symptoms.
- It is important to identify a DOT supporter and determine where and when medication will be administered.
- All close contacts under 5 years of age and HIV infected contacts are at high risk of suffering TB disease if infected and can benefit from TPT.
- The duration of initial and continuation phases of TB treatment must be explained (give the actual duration to the patient and verify that they understand).
- Explain which pills s/he will take during the full treatment course; show and explain number, colour and frequency.
- Once treatment with these medicines has begun, symptoms of TB disease will disappear quickly; but the medicines still need to be continued daily until the end of the prescribed treatment period.
- Failure to adhere to this treatment may cause TB disease to start again, with great risks for the health of the patient, because the second time around the treatment is likely not to work as well. In particular, there is a risk of developing drug resistance and transmitting the disease further to others.
- Because of the risk of transmitting TB to the community, it is the patient's responsibility to complete the TB treatment the first time. Interrupting treatment puts the community at risk.
- Sputum-smear examinations are required at certain intervals to monitor the progress towards cure. Explain to the patient when the examinations are required.
- TB and HIV are different diseases, but HIV is common in TB patients.
- TB can be cured, even when you have HIV.
- It is important for the nurse or doctor and the patient to know the patient's HIV status so that the patient can have access to better treatment, including ART.

10.8.5.2. Additional information for returning treatment interrupters

- Adjustments need to be made to the treatment provided;
- Repeated treatment interruption will not be tolerated and may eventually result in drug resistance and longer treatment durations and longer hospitalisation.

10.8.5.3. Examples of verification questions to be asked from each patient:

- "What is the disease you have?"
- "How is this disease spread?"

- "What can you do to avoid infecting others?"
- "How will you be treated?"
- "Can TB be cured?"
- "What medicines will you take and for how long?"
- "Are TB and HIV/AIDS the same? Explain"
- "Why is it important to know your HIV status when you have TB?"
- "How can you benefit from knowing your HIV status?"
- "Why is it important to have a DOT supporter?"
- "What are common side-effects and what can you do about them?"
- "Which are serious side-effects that must make you come to the hospital immediately?"

10.8.5.4. During treatment

- Re-emphasise the need for follow-up visits and investigations
- Patient should inform the staff at the clinic when s/he intends to travel. An adequate supply of medicines can then be given to cater for the period of travelling
- Patient should inform the staff at the clinic when s/he intends to move to another area. The clinic staff will then write the transfer letter and give advice as to where treatment can be continued.

10.8.5.5. At the end of treatment

- TB may occur again, especially if one is HIV positive;
- The patient should report immediately to the TB clinic, when s/he notices similar symptoms, to be examined for recurrence of the disease.
- It is important to maintain a healthy lifestyle, even after TB treatment.

10.9. Communinty education

It is important for all sectors of the community to understand TB prevention, disease and management. Important partners in community education on TB are community leaders, schools, all HIV organisations, businesses and the private health sector as well as specific sectors with a potentially high TB burden (prisons, police holding cells, hostels for migrant workers, army barracks).

10.9.3. Messages to stress during community education

- Namibia has one of the worst TB epidemics in the world.
- TB is caused by type of bacteria (germs) that are passed on from one person to another through the air, and is not caused by witchcraft, dust, sharing utensils or inheritance.
- Everybody who has a cough for two weeks or more, or has coughed up blood should go to a clinic or hospital to have his/her sputum examined for TB.
- TB treatment is free of charge in government and mission health facilities.
- TB can be cured completely if you come early when you are ill and take the treatment to the end.
- TB patients who are not on treatment are spreading TB disease within their families and

communities.

- TB patients on treatment are not infectious and do not need to be isolated or shunned; but rather need support and encouragement to complete their treatment.
- There is no danger in being close to a TB patient who is on TB treatment: touching, sleeping, and sharing food or eating utensils is safe.
- TB and HIV are different diseases, but HIV common in TB patients. Most patients with TB in Namibia
- do not have HIV.
- TB can be cured, even when a person has HIV.
- All TB patients should have an HIV test, so that those who are HIV positive should be treated for HIV.

10.9.4. What communities can do to prevent TB

- Community members should identify friends and colleagues with chronic cough, weight loss, and prolonged fever and advise them to be tested for TB and HIV as soon as possible.
- People should cover their mouths when they cough (cough hygiene), preferably with the inner part of the elbow, a handkerchief or tissue paper.
- Houses, barracks and correctional facilities and public transport should be kept clean and well ventilated, with windows kept open as much as possible.
- Houses should have wide windows for ventilation and sunlight.
- Avoid overcrowding in correctional facilities, hostels, barracks and private homes, if possible.

10.9.5. What leadership can do in the fight against TB

- Include TB and HIV in their health agenda and ensure that the health agenda is represented in every sector.
- Stress the importance of fighting TB which is a widespread disease but is very curable.
- Allocate sufficient human and financial resources to fight TB.
- Mention the need to fight TB in public addresses.
- Stress that TB and HIV often go together - but not always, and that every HIV infected patient should be regularly screened for TB, while every TB patient should be tested for HIV in order to access life- saving HIV treatment if HIV positive
- Be sincerely committed to fighting poverty and HIV, as both are fuelling the TB epidemic.
- Ensure social protection for patients, families and communities affected by TB; they must be prevented from suffering economic losses because of TB.

11. PATIENT-CENTRED CARE, PSYCHOSOCIAL SUPPORT AND REHABILITATION

11.1. Socio-economic support for TB patients

11.1.1. Introduction

TB is a social disease, thus optimally managing people with TB depends on actions not only within the health care sector, but outside the health sector as well. TB treatment and care therefore needs to be complemented with efforts to address psychosocial and economic needs of TB patients and their families in a holistic manner. Failing to address the social and economic conditions that create vulnerability to TB will directly impact the ability to effectively combat the disease.

The link between TB and poverty is well documented, with poor communities having higher TB incidence and case fatality rates. Poverty is a risk factor in becoming infected with TB and impoverished families become further burdened when dealing with TB. Regions with high poverty levels have a higher TB burden.

There has been a recognition of the importance of social and economic policies and interventions in supporting TB control efforts. The WHO's End TB Strategy advocates a comprehensive social protection system as a core element of TB care and prevention.

TB patients face many social and economic problems which lead to poor adherence to treatment and care, and subsequently to loss to follow up. Patients receiving TB treatment may also experience other psychological problems such as depression and anxiety that may interfere with their ability to complete treatment.

11.1.2. Catastrophic costs

Catastrophic costs are defined as the total (indirect and direct) expenses exceeding 20% of a household's annual income. The total indirect and direct costs of TB are defined as the sum of:

a) Out-of-pocket payments for TB diagnosis and treatment made by TB patient's households, net of reimbursements;
b) Payments related to the use of TB health services, such as payments for transportation, accommodation or food, net of any reimbursements to the individual who made the payments;
c) Income losses incurred by both the TB patient and any accompanying household member, net of any welfare payment.

Although TB diagnosis and treatment are free of charge in Namibia, TB patients face high indirect cost due to TB illness and in the process of seeking care. In Namibia, estimates of the indirect costs of treating a susceptible TB patient can range between N$50.00-N$20,300, according to an assessment of community- based tuberculosis care conducted in 20149. This

9 Verduin R, Vaughan K. Community-Based Tuberculosis Care Assessment Namibia 2013-2014. Windhoek; 2014

amount is estimated to be much more for DR-TB patients. Such expenses are a contributing factor for many TB patients not seeking treatment or failing to complete treatment.
With the adoption of the End TB Strategy in Namibia, Namibia aims to eliminate catastrophic costs faced by TB patients in 2020. This calls for bold policies and programmes around social protection, poverty alleviation and action on other determinants of TB.

11.1.3. Preventing catastrophic costs faced by TB patients

A key step to eliminating catastrophic costs related to TB and its treatment is to assess social and financial barriers to prevention and care. Efforts to address socioeconomic needs of TB patients that included in Namibia's TBL MTP-III include the following:

- Enhancing community awareness on social insurance and social assistance,
- Streamlining and monitoring the distribution of nutritional supplements for TB patients,
- Supporting the establishment and maintenance of income generating projects,
- Implementing targeted patient support system for all TB patients, and
- Maintaining transport reimbursement schemes for DR-TB patients.

11.1.4. Screening for socio-economic problems

11.1.4.1. Screening

Screening for 'social status' should be performed by the health care worker before any TB patient commences treatment. Patients should be asked about the following:

- Family set up (number of family members, dependents, etc.),
- Risk factors for TB (alcohol use, smoking, previous history),
- Employment status (current employment, disclosing to employer, financial situation regarding employment, sources of income during treatment),
- Educational level, and
- Housing environment (location and type of housing).

If the responses indicate an increased risk of socioeconomic instability, such patients should be referred to a social worker within 4 weeks of commencing treatment for drug susceptible TB. For drug-resistant TB, it is preferable that a social worker assess the patient at the beginning.

11.1.4.2. Social assessment

All patients referred for assessment by a social worker should have this assessment conducted within the first 4 weeks of anti-TB treatment.

11.1.5. Psycho-emotional support

All TB patients should be offered counselling by a health care professional after their diagnosis and at the start of treatment. This counselling can include the following topics:

- Education on TB
- Treatment and care of TB
- Importance of adherence
- Risk factors (alcohol use and smoking)

11.1.6. Economic support

Below are various economic support systems which can be accessed by TB patients in Namibia.

11.1.6.1. Disability grant for those with long term illness

The disability grant is given to people with temporary or permanent physical, mental or functional disability. Any Namibian national deemed by the state medical officer to have a significant disability and is not formally employed may access this grant. Patients with temporary functional impairment based on certain circumstances such as prolonged hospitalisation, which prevents the patient from engaging in meaningful economic activity, may also access this grant. A medical officer, together with a social worker perform the assessment and complete the relevant form(s).

11.1.6.2. Nutritional support

Nutritional support is crucial to improving the nutritional status of TB patients and can act as a powerful adherence enabler. Patients with nutritional needs may be linked to a nutritional supplement scheme, soup kitchens or other feeding scheme from the MoHSS, local government, corporate sector or NGO/CSOs.

11.1.6.3. Transport support

Where possible, patients should receive support to ensure that they access treatment. Where available, a transport reimbursement scheme may be applied. This scheme may be implemented through selected NGOs which are reimbursed for expenditures incurred in transporting patients from their respective residences to treatment facilities and back. If patients cannot, access follow-up services due to lack of transport, there should be optimisation of the role of community-based cadres in their management.

11.1.6.4. Orphans and vulnerable children's fund

The orphans and vulnerable children's (OVC) fund is a fund that is specifically for orphans irrespective of the cause. It provides a monthly allowance or each orphaned Namibian child who is considered a minor. Children of recipients of the medical disability grant automatically qualify for the OVC fund. This means children of any parent(s) with DR-TB are also recipients of the OVC grant.

11.1.6.5. Social security sick-leave benefit

Patients who are formally employed and contribute to the Social Security Fund are eligible for this benefit, but not for the disability grant. The sick leave benefit is payable when an employee is booked off-duty by a medical practitioner for 30 or more consecutive days and has exhausted paid sick leave days as provided under the Labour Act or contract of employment. The medical officer and the patient complete forms issued by the Social Security Commission to allow the patient to claim compensation for the period away from their place of employment.

11.1.6.6. Negotiating with employers

Employment is the only source of income for most people. Patients often have anxiety about job security when they are sick and employers, on the other hand, may not understand the

nature of the disease and are inclined to terminate the employment of a sickly employee. Health care professionals should educate the employers and negotiate on behalf of the patient since the duration of the sick–leave granted may be longer than what is allowed by the employer. Employers need to be encouraged to take a supportive stance towards
employees with infectious diseases; that way employees feel free to disclose and seek treatment, rather than hide their disease and spread it. In the same vein, if employers support treatment administration, they ensure that their employees are cured and they have a healthy workforce.

11.1.6.7. Income generating activities

Where feasible, patients should be encouraged and supported to engage in income generating activities. This approach has the following benefits:

- Takes advantage of existing skill-pool among patients,
- Patients get to learn new skills,
- Patients are kept occupied, particularly those who would otherwise be unemployed, and
- There is potential for patients to receive income and/or nutritional benefit from such activities.

The range of activities that can be considered includes agricultural (gardening, small livestock farming, egg-farming), handicraft (basket weaving, carving, sewing) and handyman-type activities (cleaning, repair work, etc.)

11.2. Rehabilitation

11.2.1. Introduction

Rehabilitation is a set of interventions designed to optimise function and reduce disability in individuals with health conditions through the interaction with their environment. The aim of rehabilitation is to improve health for individuals and communities. Rehabilitation can reduce the length of hospital stay, prevent readmission and maximise people's ability to live, work and learn. Rehabilitation can reduce functional difficulties by some of TB patients, and improve quality of life.

Rehabilitation services should always form part of patient management. Professionals providing these services include occupational therapists, physiotherapists and medical rehabilitation workers. However, rehabilitation professionals are not always available, and health care professionals can be trained to provide basic rehabilitation services, such as screening audiometry and mobilisation of bed-ridden patients.

11.2.2. Pre-treatment screening

Patients with drug resistant TB and those with extra-pulmonary TB should be prioritised for disability assessment rehabilitation professionals where possible. All other patients should undergo basic screening by the health care worker managing patients. This screening should include checking for pre-treatment disability, assessing mobility (walking and moving reasonably well), asking about hearing function, and looking for any impairment that may have been caused by the current disease process.

Patients with significant disability, those who report diminished hearing or and those with any significant impairment of function should be referred for full disability assessment by a rehabilitation professional.

11.2.3. Disability assessment

Patients with EPTB, DR-TB, pre-existing disability and any other functional impairment should be assessed comprehensively by a professional at the beginning of their TB treatment. The following should be included in the assessment and recorded:

- Pre-treatment impairments, if any,
- Pre-treatment hearing function,
- Impairments caused by the disease (usually related to the site of the disease such as spinal TB causing paralysis or decreased mobility),
- The patient's pre-treatment occupation, and
- The patient's interests, habits, hobbies and leisure activities.

Based on the pre-treatment assessment, rehabilitation needs may vary. The aim of rehabilitation is to assist patients to achieve and maintain optimal functioning, by improving their health and by increasing their participation in life, such as in education and work.

For children in particular, rehabilitation optimises development, with far-reaching implications for participation in education, community activities and in later years, work. For a school-going child the aim of rehabilitation should be to maintain educational activities while the child is undergoing treatment.

It is important for rehabilitation professionals to continue assessing patients regularly and monitoring the individual situation of each patient, while working together with the social worker, medical officer, TB nurses and other members of the team.

11.2.4. Rehabilitation activities

Rehabilitation activities should be tailored to suit the environment and specific setting, ensuring patients are comfortable and able to follow prescribed activities.

11.2.4.1. Weekly activity plans

A weekly activity plan can be established for hospital settings to encourage functional independence in the activities of daily living. This can be done by the development of a schedule to encourage patients to engage in activities of daily living such as:

- Personal hygiene activities (e.g. washing, dressing, nail care and hair care)
- Exercises (e.g. walking, stretching and use of rehabilitation equipment)
- Work (e.g. tasks in the ward and income generating projects)
- Leisure activities (e.g. games and reading)

A weekly activities plan will assist in the maintenance of patients' occupational skills and assist patients to develop new occupational skills and healthy routines while they are on treatment. Furthermore, it assists in uplifting patients' morale and prevent anxiety and depression.

11.2.4.2. Mobilisation and physical exercise

Patients who are bedridden or have impaired mobility should be assisted with specific mobilisation techniques and physical exercise. They can participate in planned mobilisation tasks such as walking and are encouraged to spend as much time out of bed as possible.

11.2.4.3. Preventing and managing contractures

Patients with impaired mobility are at a high risk for contractures, especially when they are hospitalised. They should be encouraged to adopt the correct positions in bed and when sitting. They should move joints fully every day and perform stretching exercises.

11.2.4.4. Preventing pressure sores

Similar to contractures, patients with impaired mobility (particularly if bedridden) are at a high risk for developing bed sores (decubitus ulcers). Patients should be encouraged to move regularly in and out of bed
and changing at least every two hours. They should maintain or improve personal hygiene, keeping the skin dry but nourished while taking adequate nutrition and fluids. Health care workers should check pressure points daily and change bedding as soon as it gets wet or soiled. Using linen savers assists with keeping bedding dry. Bony areas may be protected with soft padding or pillows.

11.2.4.5. Support for respiratory insufficiency

Some patients with TB and extensive lung damage may suffer respiratory insufficiency. It is discouraged for such patients to lie flat in bed for prolonged periods. Patients are encouraged to walking and active movement if possible. Bed ridden patients encouraged to take deep breaths and cough every 30 minutes. If the patient has difficulty with coughing a health care professional may assist with percussing or clapping the chest with cupped hands. After clapping the upper half of each side, the patient should sit up and cough. When doing this with children, the child can lie on the knee of an adult person.

11.2.4.6. Provision of assistive devices

Patients with TB and physical disability should be considered for assistive devices such as mobility aids or wheelchairs. Rehabilitation professionals are trained to prescribe or refer for the needed devices. Patients with hearing impairment may be referred to an audiologist or ear nose and throat (ENT) specialist for a hearing aid.

11.2.5. Screening audiometry

All patients with DR-TB and should undergo screening and monthly audiometry because they receive potentially ototoxic medications. Monitoring the audiological function this way is an important tool to detect impairment early and prevent further disability.

Whenever audiometry is performed, there should be a physical examination of the ears with an otoscope and charting on an audiogram chart. The audiogram shows the hearing intensity threshold (in decibels-dB, shown on the vertical axis) for each ear at various frequencies (in Hertz-Hz, shown on the horizontal axis). The threshold on the right ear is usually plotted as an O whereas that for the left ear is plotted as an X.

The figure below shows an example of an audiogram showing a 35dB decrease in hearing threshold on the right ear at 8000Hz (right) from a normal baseline (left).

Figure 13: Example of an audiogram

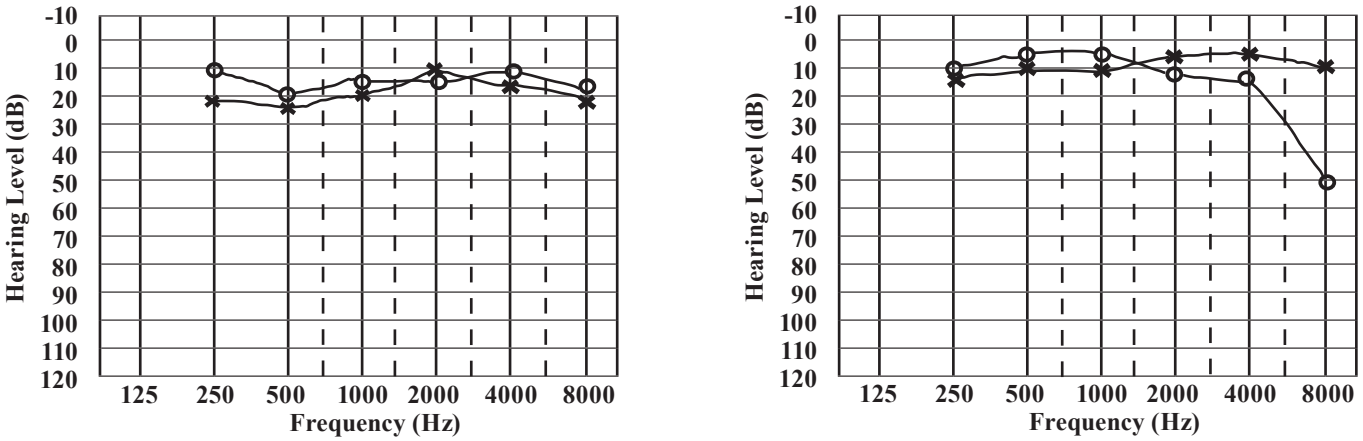


Table 36: Threshold level interpretation for audiograms

Interpreting the threshold hearing levels on an audiogram Threshold level (read per frequency per ear)	Classification
0-25 dB	Normal hearing
26-40 dB	Mild hearing loss
41-70 dB	Moderate hearing loss
71-90 dB	Severe hearing loss
>90 dB	Profound hearing loss

12. RECORDING AND REPORTING

12.1. Introduction

Recording and reporting of TB data is vital for Monitoring and Evaluation for the TB programme. Collection of tuberculosis (TB) data forms part of the general health information system, which aims to:

- Ensure a continuum of care, information-sharing with patients and transfer of information between health facilities,
- Enable managers at different levels in the NTLP to monitor programme performance in a standardized and internationally comparable way, and
- Provide the basis for programmatic and policy development.

Establishment of a reliable recording and reporting system is an essential part of the End TB strategy. These guidelines are accompanied by forms, registers and reporting templates that are designed for paper-based and electronic recording and reporting systems. These tools are intended to be illustrative rather than prescriptive and demonstrate how a minimum data set for recording and reporting could be compiled. It shows how the revised case and outcome definitions can be incorporated into a country's TB recording and reporting system.

12.2. Monitoring and evaluation

Monitoring and evaluation (M&E) is a process that helps improve performance and achieve results, with the goal of improving current and future management of outputs, outcomes and impact. The NTLP's M&E system is guided by the input-process-output-outcome-impact results logical framework as indicated in the table below.

Table 37: Monitoring and evaluation log framework

Input →	Process →	Output →	Outcome →	Impact
Policy environment Strategies Guidelines Human Resources Infrastructure Funding for TB and leprosy, Medicines, basic needs and commodities	Coordination and management Training Procurement and supply chain management Communication Advocacy Distribution Dissemination	Increased diagnostic and treatment services delivered Increased numbers reached Improved knowledge, attitudes, and practices Reduced stigma Well-equipped laboratories	Improved coverage Changed behaviour Improved Case detection Improved case management	Reduced prevalence of TB infection Reduced prevalence of TB disease Reduced TB morbidity Reduced TB mortality Reduced leprosy prevalence

Inputs: Inputs are the means or resources necessary for the programme's activities (process), such as the human, financial, supplies and equipment available to implement a particular diagnostic procedure or to maintain a set of patient records.

Process: These are a set of activities such as training of staff, procurement of equipment or writing of reports or any other activity that are required to translate inputs into outputs. This is the primary role of the NTLP and other implementing partners

Outputs: The products or services produced or provided are the outputs from the processes, such as number of patients reached with various interventions.

Outcome: Outcomes are the expected results or effects of outputs e.g. improved case detection.

Impact: The ultimate desired impact is on the population and is measured mortality and morbidity rates in a specific population. The main challenge is to demonstrate that inputs produce the desired impact (decreased mortality and morbidity related to TB), given the contextual factors and the process-level variables.
At every level of care, the M&E system considers all the five components of the framework in order to be comprehensive and relevant to the NTLP and to the mission of the MoHSS and the Stop TB Strategy to which the program is aligned. For each of the strategic results, outcomes were defined for which outputs and output indicators were also defined based on set targets derived from global targets, historical trends, available funding and institutional capacities.

12.3. TB Recording tools

The following data collection tools and mechanisms should be used for recording and reporting as (TB01- TB20) annexed to these guidelines. Before submitting data to the next level, each health facility, district and region should fully utilise the data they collect in order to improve TB control interventions in their catchment area.

12.3.2. Sputum Examination Register

This register should be kept in each health facility and each department in the hospitals. When a presumptive TB case has been identified, the patient's information as well as the date sputum specimens were collected and sent to the laboratory should be written in the register. Laboratory results will be entered into the sputum examination register, and the time elapsed between sending and receiving the results (turn- around-time, TAT) recorded. The TAT should ideally not exceed 48 hours. When the sputum specimen is bacteriologically confirmed, the patient should be traced and started on TB treatment immediately and the date recorded in the comment section of the register.

12.3.2. TB Laboratory Register

This register should be kept in the district laboratory. All patients or clients whose sputum was collected for investigation must be recorded in the TB laboratory register. The purpose of the register is to ensure that all presumptive TB cases have the correct diagnostic test requested and performed, and have their results are recorded. The DTLC should regularly (weekly) review this register to ensure that all bacteriologically confirmed cases are registered in the district TB register.

12.3.3. TB Patient Treatment Card

This card is issued and completed after a patient is diagnosed with TB. It contains information about the TB patient's details (name, age, sex, address, and contact details), the patient's diagnostic classifications, results of

initial and follow-up sputum-smear examinations, treatment regimen, medicine doses, initial and follow-up body weight, HIV status, and medicine collection data.
The card must be completed in full in order for it to be useful both for the patient monitoring and for gathering accurate information for programme analysis. The TB Patient Treatment Card should be kept at the health facility at which the patient receives his/her anti-TB medicines. The card should not be transferred with the patient in the event that a patient relocates. A new card should be issued at the referral TB treatment site when the patient reports and hands in his/her referral form. However, a copy of the original card can be made and sent to the new facility

12.3.4. TB Patient Identity Card

This is a small card pocket-friendly card that is issued to the patient at the start of TB treatment and should be stapled into the health passport. This card contains an extract of the information of the TB Patient Treatment Card. Daily DOT must be recorded on this card during the intensive phase of the TB treatment. Unlike the TB Patient Treatment Card, the patient must keep this card with his/her health passport. It serves as a quick reference by any health facility, and the patient can access treatment upon presentation of the card. HCWs should advise the patient to keep the card safely even after completing treatment as it is a reference document for the TB treatment for the rest of his/her life.

12.3.5. Facility Tuberculosis Treatment Register

This register is kept and maintained at all health facilities. The demographic information of the patients (name, sex age residential address) and all the relevant information for treatment and monitoring should be completed in the register. It facilitates easy and quick recording and monitoring of regular attendance of patients during treatment. The facility TB focal nurses should ensure that the facility register is updated on a regular basis.

12.3.6. District Tuberculosis Register

The TB register is the cornerstone of the NTLP monitoring and evaluation system. It records essential information for notification and treatment outcomes by district. The information captured in this register is sourced from all facility registers of a specific district. The DTLC should update the District TB register with new information from the Facility TB Treatment Register during each clinic supervision visit. The register must always be kept up-to-date with all relevant data such as sputum examinations, treatment outcomes and TB/HIV data. The information in the District TB Register should be entered in the Electronic TB register. At every opportunity the electronic register should be updated and regular reports generated from it for programmatic use. On the regular basis, the paper-based registers and the electronic register should be compared to ensure concordance.

12.3.7. Community-based DOT Card

This car is the community-based equivalent of the TB Treatment Card and should be used by DOT supporters for each patient who is on ambulatory treatment. It should be kept by the DOT supporter, who records on it each day DOT is administered to the patient. The nurse in the health facility from where TB medications are collected will indicate the period for which medicines were issued on the card.

12.3.8. Tuberculosis Patient Transfer Form

The TB *Patient Transfer Form* should be completed in triplicate and the original given to the patient who wishes to move to another district for continuation of his/her TB treatment. The second copy should be sent to the receiving district SMO, for the attention of the DTLC, while the third copy remains in the booklet. The DTLC at the receiving district should record the patient in the *District TB Register* as a "Transfer In" patient and will open a new *TB Treatment Card*, recording all the information on the *TB Patient Transfer Form*. The patient can continue his treatment as required and his treatment outcome is captured in the *District TB Register*. The outcome of treatment is recorded on the bottom section of the TB Patient Transfer Form, and the slip should be sent back to the transferring district. The latest treatment outcome can now be captured in the treatment outcome analysis of the district where the patient was first registered, where the notation "transfer-out" is deleted and replaced by this latest treatment outcome.

NB: *The treatment outcome of "transfer out" should be temporary and patients who still have that outcome at the end of the cohort reporting period are assumed to not have been evaluated. That is an undesirable outcome.*

12.3.9. DR-TB Patient Booklet

This booklet is used for patients managed with second-line anti-TB medicines. The DR-TB Patient Booklet includes additional sections for recording DOT during initial and continuation phase and monitoring of adverse effects of second-line medicines. The booklet should always be kept at the health facility where the patient receives TB treatment. On discharge from the DR-TB treatment centre, a duplicate of the booklet may be sent electronically to the district where the patient will continue treatment. The communication should be directed to the SMO, for the attention of DTLC. A DR-TB *Patient Transfer Form* will accompany the patient.

12.3.10. Drug-resistant Tuberculosis (DR-TB) Register

The DR-TB register is used to record essential information for notification and treatment outcomes by district. The register must always be kept up-to-date with data on sputum smear / culture examinations and treatment outcome. The DTLC should keep one DR-TB register per district. The following categories of patients should be recorded in the DR-TB register regardless of whether they are on treatment or not: confirmed MDR-TB, Poly-drug resistant TB, any other rifampicin resistant TB and XDR-TB. In addition, patients who are started on empirical second line treatment should be recorded as clinically diagnosed DR- TB.

12.3.11. Drug-Resistant Tuberculosis Patient Transfer/Referral Form

This form should be completed for all patients on treatment for DR-TB being transferred from one district to another. The reason for the transfer must be documented and communicated with the patient and patient's relatives to solicit their support.

The form has two tear-off feedback forms, one to acknowledge receipt of the patient and the other to inform the referring facility of the final outcome. The MoHSS medical referral form or cover letter signed by doctor in charge of treating the patient should also be completed and attached to the DR-TB Patient Transfer/Referral form.

12.3.12. Tuberculosis Contact Investigation Slip

This is a slip issued to request the contacts of a TB patient to be screened for TB. All TB patients should have

their contacts identified and listed, then a Contact Investigation Slip should be completed for each contact. The details of the outcome of the contact investigation should be recorded on the tear-off slip.

12.3.13. Client TB Preventive Therapy Card

This card is for clients who receive TB preventive therapy (TPT). It contains an TPT number, personal patient information, start and end dates of TPT, and dates of 4-weekly medicine collections. These clients should not be registered in the *District or Facility TB Register*; they must instead be registered in the *TPT Register*.

12.3.14. TB Preventive Therapy (TPT) Register

All clients receiving TPT should be recorded in the *Health Facility TB-TPT Register* for purposes of monitoring of client adherence and TPT outcomes. Clients entered in this register include contacts who are less than 5 years old, and those with other immunosuppressed contacts. A similar register should be kept in the HIV clinic.

12.4. TB Reporting tools

12.4.1. District TB and TB/HIV quarterly report

- Tuberculosis case-finding: This report is generated from individual patient notification data recorded in the District TB Register and should exclude transfer in patients[10]. The district data are again aggregated to regional and national level. The report is of critical importance to monitor the trend of TB notifications and may give an indication of the trends in TB incidence as well as the diagnostic performance at all levels. The DTLC is responsible for the timely and complete submission of correct reports to the District SMO and the RTLC, within 15 days after the end of the quarter as indicated in Table 38. A similar report should be produced for each health facility in order to monitor the distribution of TB patients.
- Quarterly Report on Treatment Outcomes: This part of the report is generated from individual patient data recorded in the District TB Register. The district data are again aggregated to regional and national level. This report reveals the performance of operational levels in treatment outcomes. A similar report should be produced for each health facility in order to monitor the performance of TB management per health facility. The DTLC is responsible for the timely and complete submission of correct reports to the District SMO and the RTLC, and these reports should reach national level within 15 days after the end of the quarter.
- To avoid double registration, patients who were "Transferred-in" are not included in treatment outcome analysis in the quarterly treatment outcome analysis of the receiving district. The treatment outcome should instead be included in the report of the transferring district. The final outcome analysis and reporting for the national level should not have the column on transfer out as at this stage all transferred patients should have an outcome. Otherwise patients from this category may be recorded as not evaluated if they do not fit into any of the categories of dead, failed treatment, treatment completed, or cured.

12.4.2. DR-TB Quarterly Report

This report aims to aggregate data on DR-TB per district by cases notified in that reporting quarter. In addition, this report also shows the gross and net burden of DR-TB cases in the district each quarter, the HIV status, and the interim outcome analysis. The reporting periods are the same as for the district quarterly report discussed above.

[10] Not included in these guidelines

12.4.3. Quarterly Outcome Report for TB Preventive Therapy (TPT)

This report should be compiled quarterly and summarises the notification of close contacts for TB cases for the specific quarter and outcome of contacts commenced on TPT during the same quarter of the previous year. Outcomes for under-five contacts of bacteriologically-positive cases and those for adults commenced on TPT due to immunosuppressive conditions should be disaggregated.

12.4.4. District Quarterly Report on Community-based Tuberculosis Care (CBTBC)

This form summarises the implementation of community-TB care activities in a specific quarter and should be completed by the DTLCs with input from the organisations providing CBTBC services in the district. Data reported should be verified to avoid duplications of figures already reported in a previous quarter, the figures reported should be aligned to what was reported in the district for the same period.

12.4.5. Namibia ACSM Documentation Format on ACSM activities

This form should be compiled on a quarterly basis and should include information on all ACSM activities implemented in the district during the quarter under review. The report should be completed by the DTLCs with input from the organisations implementing ACSM activities in the district.

Table 38: Quarterly reporting deadlines

Reporting deadline	Reports to be submitted
15th of January	TB case-finding and all related reports for the cohort registered in the just ended Quarter 4 of the previous year (1 October – 31 December). Treatment outcomes for the cohort registered in Quarter 4 of the preceding year (1 October – 31 December
15th of April	TB case-finding and all related reports for the cohort registered in the just ended Quarter 1, same year (1 January – 31 March). Treatment outcomes for the cohort registered in Quarter 2 of the previous year (1 January – 31 March)
15th of July	TB case-finding and all related reports for the cohort registered in the just ended Quarter 2, same year (1 April – 30 June) Treatment outcomes for the cohort registered in Quarter 3 of the previous year (1 April – 30 June)
15th of October	TB case-finding and all related reports for the cohort registered in the just ended Quarter 3, same year (1 July – 30 September) Treatment outcomes for the cohort registered in Quarter 4 of the previous year (1 July – 30 September)

12.5. Data review meetings

These meetings should be conducted on a regular basis to review, validate, analyse and identify challenges related to data and programme management. At these platforms, programme officers (TB, Leprosy and HIV) at all levels review their data, share experiences and find solutions to challenges hampering TB, Leprosy and TB/HIV control efforts in their localities. Participants are expected to make use of data at this platform to inform programme planning. Continuity of these meetings is vital for improving data quality and utilisation at local level. Regions are encouraged to include these meetings in their annual budget requests

The data review meetings will be conducted as follows;

District review meetings: All health facilities within a particular district are represented, together with the laboratory, CHWs and supervisors, environmental health practitioner, DCC representative, and convened by the DTLC. AT this meeting, Facility TB Registers are reviewed against Treatment cards, the District TB Register and patient lists from the laboratory register. Information for HIV positive patients is also updated based on verification with the ART registers. This forum, which may be held monthly, will also ensure electronic platforms are updated.

Regional quarterly data review meetings: All districts in a particular region will come together and review their TB, TB/HIV and Leprosy data. This forum is used for data cleaning and to finalise the district and regional quarterly reports. Additionally, this is also used for capacity building on TB, TB/HIV and Leprosy data management. The activity report for these meetings should be compiled and submitted to both the CMO and the Regional Director together with the quarterly reports. Expected participants include: RMT (CHPO/SHPO, CMO, EHO), SMO, DTLCs, PHC Supervisors, Data Clerk, laboratory, TB/HIV focal persons, representatives of CSOs, CHW supervisors, social workers and other stakeholders.

Q**uarterly Zonal review meetings:** The purpose of these meetings is to analyse, interpret and address challenges related to TB, TB/HIV and Leprosy data and programme management. At these meetings, a number of regions (two to four) will come together and review their TB, TB/HIV and Leprosy data. This forum focuses more on data analysis and programme performance and should be used to share update on new program management development and build capacity on data utilisation for decision making. Participants include Regional representatives (CHPO/SHPO, CMO, SMO, Matron, PHC Supervisor) and DTLCs, Representatives of CSOs, and other stakeholders.

National review meetings: These aid the national level in monitoring trend and putting measures in place to improve or change strategies as necessary. This forum allows the NTLP programme officers to validate the data submitted by the various regions while compiling the national report. The annual DTLCs and RTLCs fora are also considered national review meetings.

12.6. Supervision

12.6.1. Introduction

Supervision is the process by which a trained senior professional helps another person to learn and develop professionally through engaging in a process of review of and reflection on their work. It involves support, managing and evaluating of work. Supportive supervision is an essential activity, which all NTLP staff must do on a regular basis. The objectives of supportive supervision can be summarised as follows:

- To check if staff performance is satisfactory, relative to NTLP technical guidelines, strategic plan and key indicators;
- To check for gaps in understanding and performance weaknesses that can be remedied through on-the- job training or in-service training;
- To identify contextual factors that inhibit or enhance proper implementation of NTLP technical policies; and
- To motivate and support health staff to perform well.

12.6.2. Frequency of supervision by different levels

12.6.2.1. District TB and Leprosy Coordinators (DTLC)

The DCC should provide reliable transport and resources for the planned visits by the DTLC. The DTLC should supervise all health facilities monthly in the rural areas and weekly in urban areas. The visit should take place on a scheduled clinic day. Health staff should be observed as the services are being conducted. The DTLC should provide guidance, advice and training to the dedicated TB clinic nurse. Praise should be given where performance is good, constructive criticism and on-the-job training if the performance is below standard.

For successful performance of the programme, the TB treatment facilities should open on time and be staffed with competent nurses. Only then can health staff credibly demand that patients stick to their appointments. The DTLC should use a checklist for each visit to a health unit and verify each time that previous recommendations were implemented. S/he should make a clinic visit schedule for the entire year for all clinic visits and indicate when the visit is planned. This schedule should be distributed to all heads of health units, as well as the RTLC and the DCC.

12.6.2.2. Regional TB and Leprosy Coordinator (RTLC)

Regional management should provide reliable transport for the planned visits by the CHPO or SHPO who has the responsibility for service delivery for TB and leprosy (thus called Regional TB and Leprosy Coordinator). The DTLC's work should be regularly supervised by the RTLC through field visits and during quarterly regional DTLC meetings. The RTLC should observe the DTLC during his/her work and a competency checklist can also be used to evaluate the DTLC's performance. The RTLC should give the DTLC feedback on the assessment of his/her performance. It is good practice for the RTLC compile a report of the supervision visit and send copies to the DTLC, DCC, CMO and national level.

12.6.2.3. National level

National level should be provided with resources for scheduled supervision visits to regions, and each region should be visited at least once a year. The national level staff should also use a standardised approach to supervision, following a checklist, and should give feedback to the RTLC on his/her performance. A written report of the supervision visit should be sent within 2 weeks to the RTLC and Regional Director.

12.7. Other reports

In addition to the routine district quarterly reports that should be reviewed and signed by the district SMO every quarter, RTLCs and DTLCs should compile a brief annual report that will be distributed to their superiors and lower levels in the MoHSS. This report should describe the performance of the programme in the district and region in relation to the work plan; indicating the epidemiological trends for TB and including an annual plan for improvement of the national, regional and district performance. The national level should compile an annual report on TB and leprosy, and publish it by end of the second quarter of each year.

13. MANAGEMENT OF ANTI-TB MEDICINES

13.1. Introduction

Management of medicines is an essential part of any health care system, and even more critical to the success of a TB programme. This is because TB is a difficult disease to cure, requiring multi-drug regimens for long treatment periods. Ensuring an effective medicine supply and management system is essential for the success of the End TB strategy. Non-availability to a patient of any of the anti-TB medicines at any time is a serious weakness in a TB programme and can contribute to the emergence of TB drug resistance. Moreover, it undermines the credibility of the TB programme in the eyes of the patient and the community, and is a serious challenge for committed programme officers and health care workers looking after TB patients.

Each health-care worker in charge of medicines supply in a health facility should be familiar with the *Managing Pharmaceutical Stores Manua*l as well as the *Pharmaceutical Standard Operating Procedures*. This manual and the SOP comprehensively cover all aspects of stock control and storage for pharmaceutical items; this also includes the use of the *Pharmaceutical Management Information Dashboard System* and electronic stock card. This chapter only highlights the most critical aspects as they relate to the management of anti-TB medicines.

The DTLC in collaboration with the district pharmacist /pharmacist assistant should take responsibility for the provision of an uninterrupted anti-TB medicine supply. Where available, electronic tools should be used for the ordering and management of anti-TB medicines and related supplies.

13.2. Stocl control

A stock control system serves two main purposes. It is effectively implemented if:

- it ensures that the correct items are available in the right amounts, at the time when they are needed;
- it improves accountability.

The advantages of a properly functioning stock control system to the patient, the health-care worker, the district hospital, and medical stores include:

- prevention of treatment interruptions
- improved efficiency in the use of financial resources
- prevention of under-stocking and stock-outs
- prevention of overstocking and wastage
- prevention of shortages in case of delays in delivery
- continued service provision even when there are staff changes
- prompt identification of security problems

The most important tool for effective stock control is the proper maintenance of up-to-date stock cards. A proper stock control system which is documented by the effective use of stock cards deals with the three main steps in the medicine distribution and supply cycle:

- **Step 1:** Ordering medicines and related supplies

- **Step 2:** Receiving medicines and related supplies
- **Step 3:** Issuing medicines and related supplies (including removal of excess or expired/damaged items from stock)

13.3. Ordering of medicines and related supplies

New supplies of medicines need to be ordered at regular intervals. Whether this is every six weeks or once per month depends on how the system is set up in each particular district. If too much of an item is ordered then medicines which might be needed urgently elsewhere will pile up on shelves and eventually expire. These medicines should be redistributed.

If too little is ordered then patients will suffer because they will not receive the necessary medication. This can have disastrous consequences for the TB patients, e.g. treatment failure, development of drug resistance and loss of credibility of the health facility and NTLP.

13.3.1. Guiding principles for the ordering of supplies

13.3.1.1. Anticipate changes in demand

The quantity of anti-TB medicines required by a health facility is directly related to the number of TB patients registered at the facility. Therefore, any increase or decrease in number of TB patients registered will necessitate an increase or decrease in future orders for anti-TB medicines.

- Do not order items simply because they are printed in the order book! Only order the anti-TB medicines that are currently used at your health facility. If there are no TB patients receiving treatment, then it is only necessary to keep a small amount of TB medication for emergencies (e.g. if a TB patient is a visitor to the area and needs his/her medication refilled). If the facility is very near its supply source, then it may not be necessary to stock any anti-TB medicines at all.
- Do not forget that if paediatric TB patients are receiving treatment or prophylaxis at your health facility, it may be necessary to order TB medicines of different formulations (e.g. syrups).
- Know when the order is to be placed and then make sure that the order book is completed and submitted in good time.
- Remember that all items are **ordered in units.** Never record an order as: number of capsules! So, if 100 rifampicin capsules are needed fill in "1" in the order column (= 1 unit = 1 container x 100 rifampicin capsules). The unit sizes are pre-printed in the order book.

13.3.1.2. Be systematic

To ensure that appropriate quantities are ordered it is easiest to systematically follow the steps described below:

Step 1: Perform a physical stock count. This should be done for every item that is normally stocked, not only items that are known to be needed.

Step 2: Decide whether or not to order a particular item. Check whether the physical stock is equal to or less than the minimum stock indicated on the stock card. If it is, order enough units to make up the maximum stock. If the physical stock is greater than the minimum stock, do not order the item!

Step 3: Complete your order book. Fill in the app ropriate amount for the items you want to order.

Reorder quantity = Maximum Stock Level – Stock on Hand

13.3.1.2. Stock management definitions

Order interval is the time between two orders. If orders are placed once a month, then the order interval is one month.

Minimum stock (reorder level) is the stock which represents the average consumption of a particular item during a period that is twice the order interval. If three units of isoniazid tablets are used per order interval, then the minimum stock level is 3 x 2 = 6 units. If the stock level equals or falls below the minimum stock level, the item should be reordered. Each item in a store has its own minimum stock which should be indicated on the stock card.

Maximum stock defines the maximum number of units of a particular item there should be in stock –do not stock more than this. The number must be written on the stock card and should equal the average consumption of that item in a time covering four times the order interval. This means that if the average consumption is three units of isoniazid tablets per order interval, then the maximum stock for isoniazid is 3 x 4 = 12 units. In this example, you should not store more than 12 units of isoniazid at a time.

Minimum and maximum stock levels can both change over time according to changes in consumption. For anti-TB medicines, these levels will change as the number of TB patients change. The initial calculations should be done by the person in charge of the store together with the DTLC, regional pharmacist or pharmacist's assistant. When these numbers are used for ordering the first time, they should be recalculated at the latest after two months. After this, the minimum and maximum stock levels should be recalculated every three or four months.

13.3.2. Receiving medicines and related supplies

When receiving supplies from the district hospital or the medical stores the following must be carefully checked;

- Are the number of boxes received the same as indicated on the delivery note?
- Are all the boxes sealed and intact?
- Check if the items received tally with those recorded on the 'goods received note', i.e. **have the right items** in **the right unit size** and **in the right quantity** been supplied?
- Do the medicines have satisfactory expiry dates (at least four times the order interval from the date of receipt)?
- Are all containers intact (nothing damaged or tampered with?)

If there are any problems with the quantity, type, expiry date or condition of any items received then contact the supplying facility immediately by telephone to report the problem. In addition, make a written statement detailing the problems found, keep one copy for your reference and send one copy to the supplying facility.

Box 15: Maintenance of stocks

Do not forget to update the stock cards after new goods have been received and with each issue of the medicine

13.4. Issuing medicines and related supplies

Each time supplies are issued it should be recorded in the stock card. Issuing of supplies includes the following:

- Removing stock from the store to the dispensing and/or treatment rooms (remember to issue stock showing the earliest expiry dates first; FEFO rule, see Section 12.3)
- Issuing stock to the outreach team
- Removing stock from the store for pre-packing
- Sending stock which is not needed (excess stock) back to the district hospital/medical store
- Removing expired medicines from the shelf and sending them to the district hospital
- Removing broken containers from the shelf

The table below shows he list of anti-TB medicines available in Namibia. When new medicines and formulations become available globally, the Pharmaceutical Services Division in collaboration with the NTLP should update the above list and facilitate their local availability.

Table 39: List of anti-TB medicines available in Namibia

Medicine	Formulation
[RHZE] adult	Fixed-dosage combination tablet: [R150mg; H75mg; Z400mg; E275mg]
[RH] adult	Fixed-dosage combination tablet: [R150mg; H75mg]
[RHE] adult	Fixed-dosage combination tablet: [R150mg; H75mg; E275mg]
[RHZ] child	Fixed-dosage combination sachets: [R75mg; H50mg; Z150mg]
[RH] child	Fixed-dosage combination sachets: [R75mg; H50mg]
Streptomycin	Powder for injection; 1g vial
Ethambutol	400mg/100mg tablet
Isoniazid	100mg tablet
Isoniazid	300mg tablet
Rifampicin	450, 150mg capsule/tablet
Pyrazinamide	500mg tablet
Ethionamide	250mg tablet
Levofloxacin	250mg tablet
Cycloserine	250mg tablet
Kanamycin	1 g powder for injection
Capreomycin	1 g powder for injection
PAS	4 g sachet
Clofazimine	100mg capsule
Amoxycillin+clavulinic acid	875/125mg tablet
Bedaquilline	100mg Tablet
Delamanid	50mg Tablet
Linezolid	600mg Tablet
Moxifloxacin	400mg tablet

13.4.1. Related supplies (Non-pharmaceutical medical supplies)

The same principles of stock management apply to these commodities. These commodities include but are not limited to;

- N95 respirators,
- Therapeutic food,
- Audiometers, and
- Point of care testing devices.

13.5. How to avoid wastage

13.5.1. Wastage due to expiry

Following the basic rules mentioned above will help to avoid wastage of medicines due to expiry.
FEFO rule: This refers to First Expiry First Out (FEFO). When new supplies are received, put them at the back of the shelf and always issue stock at the front first. However, if the expiry date of the new stock is earlier than that of the existing (old) stock, put the new stock in front so that it is used up first. This will prevent expiry of medicines.

Box 16: FEFO rule

Always follow the FEFO Rule (First Expiry – First Out):
Always issue that stock which will expire first

In addition, the following should also be routinely done:

Clearly mark containers of medicines with short expiry date (less than 12 months) – this will help bring these items to your attention when you are placing an order and dispensing medicines.

Return excess stock to the supplying facility (hospital/medical stores) as soon as you are aware of it. Once you realise that you are unable to use all of an item before its expiry date, or that you have more than the calculated stock of an item, then return it to your supplying facility (district hospital or medical stores) with documentation to show from whom it is being returned.

13.5.2. Wastage due to spoilage

Physically inspect medicine and containers for damage and spoilage. Store medicine according to recommended storage conditions.

13.6. Monitoring stocks of anti-TB medicines

In order to manage stock levels of anti-TB medicines in districts, the DTLCs together with the pharmacists/ pharmacist's assistants should produce monthly anti-TB FDC and DR-TB medicine stock reports, from all health facilities treating TB patients. This information will then be forwarded by the pharmacist to the Senior Medical Officer and copied to the regional pharmacist who should discuss any problems with the RTLC and take appropriate action where needed, as well as forwarding the information to the NTLP. The NTLP should compile a quarterly national report on the number of patients treated disaggregated by age, gender, regimens and type of TB and region, and submit the report to Pharmaceutical Services Division to assist with forecasting. These data are needed in order know the stock situation of these critical medicines in the country. This will help to monitor the stock levels countrywide and identify problems in stock control of these vital medicines.

13.7. TB medicines stock control at Central Medical Stores

The NTLP should collaborate closely with the Pharmaceutical Services Division by providing accurate data regarding predicted numbers of patients requiring anti-TB medication as well as specifications of all anti- TB medicines. This is important so that the Central Medical Stores (CMS) can enter into contracts for the correct quantities and types of each of the anti-TB medicines. Accurate information of number of TB patients will also assist CMS to maintain suitable stock levels of all anti-TB medicines, thus avoiding stock- outs.

13.8. Roles of different players in the management of anti-TB medicines

13.8.1. Role of Division: Pharmaceutical Services

- Ensuring availability of all anti-TB medicines at all times by strengthening medicine supply management through improved procurement, storage and distribution at all levels of health care
- Providing safe, efficacious, high quality and cost effective anti-TB medicines
- Strengthening the quality assurance system to ensure that safe and high-quality medicines are supplied
- Promoting rational use of anti-TB medicines by prescribers, dispensers and clients.
- Improving human resource capacity for management of all medicines including anti-TB medicines

13.8.2. Role of the DTLC in the management of anti-TB medicines

- Registering and notifying all forms of TB.
- Consulting the CCRC when needed in conjunction with the doctor in charge.
- Ensuring all prescriptions conform to national guidelines and are reflected in the registers and the TB treatment cards.
- Ordering anti-TB medicines from the pharmacy every 1-3 months
- Supervising packaging of medicines for peripheral clinics and DOT points, and provision of DOT.
- Ensuring continuous supply of medicines and proper storage, as well as reporting on usage of medicines.
- Informing the pharmaceutical staff of new cases and their regimens promptly so that the pharmacy can organise the medicine for the newly registered cases.

13.8.3. Role of the pharmacist / pharmacist's assistant in the management of anti- TB medicines

- Addressing pharmaceutical issues as a member of the local TB committee
- Supplying medicines to the TB clinic or TB ward as requested.
- Assisting the DTLC in forecasting needs.
- Ordering medicines from the relevant distribution channels
- Preventing stock-outs.

13.8.4. Role of the senior medical officer in the management of anti-TB medicines

- Supervising the diagnosis of TB patients

- Ensuring prescriptions follow the guidelines and where they do not, there are clinically sound justifications
- Consulting with the CCRC, if needed
- Reviewing the monthly report submitted by DTLC and pharmacy and taking appropriate action
- Supervising the DTLC (through the PHC supervisor) and the district pharmacist

13.8.5. Role of the TB focal nurse in the management of anti-TB medicines

- Supervising DOT
- Orders supplies from the TB clinic or pharmacy
- Making weekly (or daily) packages to hand to treatment supporters or field promoters
- Directly ensuring that treatment supporters or field promoters provide DOT as requires

13.8.6. Role of community health workers in the management of anti-TB medicines

- Collecting weekly supplies from the clinic/TB nurse
- Ensuring that medicines get to the patients on time
- Observing patients swallowing their prescribed medicines
- Reporting any problems to the DTLC/ TB nurse.

14. MYCOBACTERIA OTHER THAN TUBERCULOSIS (MOTT)

14.1. Introduction

Mycobacteria other than TB (MOTT), also termed as non-tuberculous mycobacteria (NTM), are environmental organisms capable of causing chronic disease in humans. MOTT can be very difficult to diagnose, and often require prolonged courses of therapy.

14.2. Epidemiology

Diseases due to MOTT are seen worldwide. However, surveillance data are limited and MOTT infections are non-communicable and therefore not reportable. There are more than 120 identified mycobacteria species known to cause disease in humans. By far, *M. avium* complex (MAC) and *M. kansasii* are the most common MOTT species causing disease in humans. MAC refers to two mycobacterial species, *M. avium* and *M. intracellulare.* These species constitute nearly half of all MOTT infections. Although considered a similar pathogen, *M. avium* is common in disseminated disease, whereas *M. intracellulare i*s more common in respiratory infections. The remaining cases of MOTT involve numerous other mycobacterial species, most commonly *M. kansasii, M. gordonae, M. chelonae, M. fortuitum*, and *M. abscessus.* MOTT is commonly isolated in both natural and indoor water sources, which are the primary reservoir for most human infections. Multiple species, particularly *M. kansasii, M. xenopi,* and *M. simiae* are commonly recovered from most municipal water sources. As such, not all MOTT isolates represent true infections.

In Namibia, a survey of smear positive pulmonary specimens from presumptive TB cases obtained during the 2nd National Anti-tuberculosis Drug Resistance Survey in 2015 indicated a MOTT prevalence of 7%. Of those that were confirmed through molecular methods, *M. intracellulare* accounted for 67% while *M. avium* was 4%, *M. scrofulaceum* 5%, while other unidentified species constituted 24%.

Box 17: Significance of isolating MOTT in a specimen

MOTT isolates may represent:

- **Contamination,**
- **Colonisation. or**
- **True infection**

14.3. MOTT diseases in humans

Pulmonary manifestations account for 94% of cases of MOTT, but infections involving the skin, bones, and lymph nodes do occur. Disseminated disease may occur and, without treatment, is frequently fatal.

Chronic pulmonary disease is the most common clinical manifestation of MOTT. The majority of cases are caused by MAC (either M. avium or M. intracellulare or both), followed by M. kansasii. The risk for infection increases in immunosuppressed patients or those with structural lung disease, particularly chronic obstructive pulmonary disease (COPD) and bronchiectasis. Parenchymal scarring and fibrosis from prior TB infection also increase risk of MOTT. This often poses a challenge to health care workers as reactivation of TB should be considered in cases of suspected MOTT infections.

Lung disease due to MOTT is almost always associated with symptoms such as chronic or recurring cough, sputum production, and dyspnoea. Constitutional symptoms such as fever, fatigue, malaise, night sweats, and weight loss may occur. Haemoptysis, although uncommon, can occur. Clinically, MOTT may be similar to active pulmonary TB, especially with infections caused by *M. kansasii.*

14.3.1. Pulmonary MOTT

There are two main pulmonary manifestations of MOTT: cavitary/fibronodular) disease and nodular bronchiectatic lung disease, each with a unique epidemiology and clinical course.

Cavitary/fibronodular disease is the traditionally recognised presentation of MOTT lung disease. In developed countries there is a strong male predominance, and typically patients are in their late 40s and 50s. Cigarette smoking, COPD, and alcoholism are common. Apical fibro-cavitary changes are typical. Cough, haemoptysis, and constitutional symptoms are common, and this disease is radiographically and clinically indistinguishable from pulmonary TB. In addition, acid-fast bacillus smears may be strongly positive, adding further confusion. Untreated cases are often rapidly progressive and can result in extensive lung cavitation and fibrosis, leading to respiratory failure.

Nodular bronchiectatic disease typically occurs in older women (80%) without a previous history of lung disease. Smoking and alcoholism are not common associations. Patients often share a common body morphological type: thin body habitus, pectus excavatum, kyphoscoliosis, joint hypermobility, and mitral valve prolapse. This clinical pattern has been commonly labelled the *"Lady Windermere syndrome."* X-ray images typically reveal peripheral small nodular tree-in-bud densities in a bronchovascular distribution. Focal cylindrical bronchiectasis predominates, and the right middle lobe and lingual are most often involved. This anatomic distribution likely results from impaired mucociliary clearance as a result of thoracic anatomic abnormalities (pectus excavatum and kyphoscoliosis). This form of lung disease is typically milder and more indolent and progresses slowly over years. However, disease progression is common and significant disability or even death may occur.

Hypersensitivity-like pneumonitis: MOTT can rarely present as a hypersensitivity-like pulmonary syndrome, commonly known as 'hot tub lung'. This is likely to be a manifestation of both parenchymal inflammation and active infection. Mycobacteria are resistant to disinfectants and growth is enhanced by hot, humid environments, especially standing water sources such as hot tubs or other undrained indoor sources. Clinical disease is often subacute and is predominated by cough, dyspnoea, and fever. Nodular inflammation of the lungs is common and may progress to hypoxemic respiratory failure. Similar to other forms of hypersensitivity pneumonitis, patients are typically younger and non-smokers. Results of x-ray imaging are always abnormal and commonly reveal diffuse nodular infiltrates and ground glass opacities. These are typically distributed in a centrilobular or bronchiocentric pattern, differentiating it from other hypersensitivity pneumonitis or sarcoidosis. Histopathologic examination is that of non-necrotising granulomas and organising pneumonia. The disorder is diagnosed by the isolation of MOTT with compatible clinical, radiographic, and pathologic findings.

Corticosteroid therapy may facilitate recovery and improve gas exchange. Antimycobacterial therapy may also hasten recovery and prevent the uncommon development of chronic disease. The prognosis is good and a prompt resolution of symptoms is expected following treatment.

14.3.2. Disseminated MOTT Infection

Disseminated MOTT is a life-threatening illness that occurs almost exclusively in patients with advanced AIDS. It is rarely encountered in other forms of immunosuppression, but it has been reported following renal or cardiac transplantation, chronic corticosteroid use, and leukaemia. The majority of infections are caused by M. avium and M. kansasii. Prior to effective antiretroviral therapy, nearly 40%

of patients with CD4 counts less than 10 developed disseminated MOTT within 1 year. The risk for disseminated MOTT infection increases with progressively lower CD4 counts. It typically occurs with CD4 counts below 25 but those with counts less than 50 are at risk.
Clinical findings include anaemia, fever, night sweats, weight loss, and hepato-splenomegaly. In patients initiating antiretroviral therapy, disseminated MOTT may occur as part of an immune reconstitution inflammatory syndrome (IRIS). This MOTT-associated paradoxical reaction produces an intense local inflammatory reaction to indolent MOTT infections in individuals taking ART for HIV infection. It is manifested by painful suppurative lymphadenopathy, pulmonary infiltrates, and skin abscesses.
Successful treatment requires treatment of both HIV and MOTT infections. Macrolides are the cornerstone of therapy for disseminated MOTT. Although they are highly effective, resistance and treatment failure occur in 50% of those receiving macrolides alone. Monotherapy is therefore contraindicated in disseminated MOTT infections, and regimens should include ethambutol and rifampicin.

14.3.3. Mycobacterial lymphadenitis

Lymphadenitis is an uncommonly recognised manifestation of mycobacterial infection. In the absence of HIV infection, MOTT lymphadenitis rarely occurs in adults and is primarily a disease of children. In fact, cervical adenitis may be the most common form of MOTT disease in children. The vast majority (80%) of culture-proven disease is caused by MAC, with the remaining cases caused by *M. scrofulaceum, M. malmoense*, and *M. haemophilum*.
Clinical manifestations of MOTT lymphadenitis are frequently insidious in onset and are rarely associated with systemic symptoms. Nontender, unilateral (95%) adenopathy is the most common finding and typically involves the submandibular, submaxillary, cervical, or preauricular lymph nodes. Although it is uncommon, affected nodes may rapidly enlarge, rupture, and form draining sinus tracts.
MOTT lymphadenitis is diagnosed by isolating the causative organism from lymph node cultures. In suspected cases, excision biopsy is preferred as fine-needle aspiration or incision and drainage of the involved nodes may result in fistulae formation with chronic drainage. It is important to exclude M.tb as the cause of the lymphadenitis, especially in adults where greater than 90% of culture proven mycobacterial lymphadenitis is caused by *M.tb.*
The treatment of MOTT lymphadenitis is complete surgical excision of the involved lymph nodes. Surgical resection is associated with a 95% success rate. In the absence of other sites of infection, medical therapy is rarely needed.

14.4. Diagnosis of MOTT Disease

14.4.1. Clinical features

The diagnosis of MOTT must be based on a high level of clinical suspicion that is compatible with symptoms and features found on x-ray images. Typical symptoms of pulmonary MOTT include chronic or recurring cough, sputum production, and dyspnoea. Constitutional symptoms such as fever, fatigue, malaise, night sweats, and weight loss may occur. In particular features of *M. Kansasii* are similar to pulmonary TB.

Disseminated MOTT presents with anaemia, fever, night sweats, weight loss, and hepato-splenomegaly occurring in severely immunosuppressed individuals.
A presumptive diagnosis based solely on clinical and x-ray findings, especially in normal, immunocompetent hosts, may not be correct.

14.4.2. Radiology

Fibronodular/cavitatory disease is not distinguishable from pulmonary TB on chest x-ray images. Nodular bronchiectasis presents with nodular tree-in-bud features in addition to bronchiectasis. In addition, pulmonary MOTT tends to occur in patients with pre-existing structural lung damage.

14.4.3. Bacteriological investigation for MOTT

Xpert MTB/RIF testing will fail to identify MOTT as it was designed to detect M. tuberculosis and not other mycobacterial species. However, in MOTT pulmonary disease, sputum smear microscopy is often positive for acid-fast bacilli. Therefore, a negative Xpert result occurring together with a positive smear should trigger suspicion of MOTT disease, warranting confirmation by culture and/or line probe assay.
Isolation of MOTT in culture is essential for the diagnosis of MOTT disease. In cases of pulmonary disease (the most common site of infection), bronchial cultures should be obtained. Patients should have at least 3 sputum specimens collected on separate days, and MOTT should be confirmed by positive results in at least 2 of these 3 specimens. Bronchoscopic washing may be a useful diagnostic tool if available.
In the right clinical setting, a single positive culture from bronchoscopy washing or lavage may be considered diagnostic. Specimens obtained from biopsy (transbronchial lung biopsy, surgical lung biopsy, or excisional biopsy from infected tissue) are also diagnostic if they produce isolation of MOTT or show granulomatous inflammation on histopathologic examination. In the right clinical setting with highly suspicious clinical and radiological findings, tests in which cultures are negative should be repeated as isolation of MOTT is often difficult.
A single positive culture may be indeterminate to provide a reliable diagnosis of MOTT. Contamination is common, especially with sputum samples. Even rinsing of the mouth with tap water can cause false positive results. Likewise, cleaning the bronchoscope or culture plates with tap water can also result in contamination and false-positive results.
Therefore, a reliable diagnosis must be based on both a highly suspicious clinical picture and confident microbiologic studies. Without this, all positive cultures should be highly scrutinised, especially with less common species or in species known to be common contaminants (*M. gordonae, M. mucogenicum, M. terrae, M. kansasii,* and *M. abscessus*).
Line probe assay with or Genotype® Mycobacterium CM can provide rapid identification of several common species of MOTT, including *M. intracellulare, M. avium, M. kansasii, M. gordonae, M. chelonae, M. fortuitum,* and *M. abscessus* in addition to M. tuberculosis. Another kit, Genotype® Mycobacterium AS, can be used to identify further species that Genotype® Mycobacterium CM may have failed to identify. Line probe assay should be requested whenever MOTT identification is required.

14.4.4. Differential diagnosis

The presentation of MOTT may be similar to that of active TB. Both can produce cavitary pulmonary infiltrates, extra-pulmonary disease, granuloma formation, haemoptysis, and constitutional symptoms. Therefore, TB must be excluded in all cases of suspected MOTT, especially with acid-fast bacillus smear positivity. In fact, TB is both much more common and is a higher public health threat than MOTT. Other
pulmonary granulomatous diseases such as sarcoidosis and fungal infection can resemble MOTT and should be included in the differential diagnosis.

14.5. Treatment of MOTT disease

14.5.1. Treatment regimens

The treatment of MOTT disease is seldom straightforward. Prolonged durations of therapy are frequently needed and eradication is unlikely. Often patients describe the treatment as being worse than the disease, as some patients will not have progressive disease. The decision to treat must be balanced between the risk of disease progression and unnecessary exposure to the cost and toxicity of medications; in other words, not all patients with MOTT disease need treatment. Clinicians must make careful considerations about whether or not to treat their patients.

Cure of MOTT infection may not necessarily be the goal of therapy in all patients. For some, palliation of symptoms or minimisation of disease progression may be a reasonable objective. For all patients who begin treatment, a reasonable goal may be symptomatic, radiographic, and microbiologic improvement.

Nodular bronchiectatic MOTT

- Clarithromycin 1000 mg daily (or 500 mg twice a day) or azithromycin 250 mg daily,
- Rifampicin 10 mg/kg/day (maximum 600 mg/day) or rifabutin 150 to 300 mg
- Ethambutol 15 mg/kg/day

Cavitary/fibronodular disease or severe symptomatic MOTT

- Clarithromycin 1000 mg daily (or 500 mg twice a day) or azithromycin 250 mg daily,
- Rifampicin 10 mg/kg/day (maximum 600 mg/day) rifabutin 150 to 300 mg
- Ethambutol 15 mg/kg/day
- Amikacin or streptomycin for 2 to 3 months should be considered in severe cases.

Confirmed MOTT by species

In addition to the above regimens depending on clinic-radiological presentations, some modifications may be necessary if firm identification of the species is available.

- In MAC infections, rifampicin, ethambutol and clarithromycin/azithromycin suffices in mild- moderate macrolide-susceptible disease. Extensive disease warrants addition of an aminoglycoside injectable. For suspected or confirmed macrolide resistance, isoniazid or fluoroquinolone may be added.
- In M. kansasii infections, isoniazid should be added as M. kansasii is often susceptible.
- In M. abscessus (rapidly growing) infections, cefoxitin should be added to the treatment.

14.5.2. Treatment duration

Successful treatment outcome is defined by resolution (or control) of symptoms and conversion of sputum cultures. Sputum cultures should be obtained monthly during therapy to help assess treatment response and guide the duration of therapy. Clinical improvements within 4 to 6 months of beginning therapy and negative sputum cultures typically occur within 6 to 12 on adequate therapy. Treatment should be continued for up to 12 months of documented negative sputum cultures. Therefore, the typical duration of treatment is 18 to 24 months, but it can be longer for some.

14.5.3. Outcome of treatment

Unfavourable outcomes are common, and treatment failure is considered if there is no clinical improvement after 6 months or no negative sputum culture after 12 months of appropriate therapy. Treatment failure may be related to treatment noncompliance or intolerance, anatomic defects (cavitation or bronchiectasis), or drug resistance (especially to macrolides).

Relapses and re-infections are also common and may not be related to drug susceptibility.

Macrolide resistance occurs and typically results from macrolide monotherapy or the concomitant use of quinolones. Regimens that do not include ethambutol are also associated with the development of drug resistance.

Surgical resection has been shown to improve outcomes in some patients with MOTT infection and should be considered as an adjuvant or alternative to medical therapy.

15. APPENDICES

Appendix 1: Responsibilities, functions and tasks of the various levels of the NTLP

1. National level

Overall responsibility

Planning, resource mobilisation, supervision, monitoring and evaluation of TB and leprosy control at all levels.

Functions and tasks

- Advising the Director for the Directorate of Special Programmes in the MoHSS on all matters concerning TB and leprosy control.
- Advising regional management committees on all matters pertaining to TB and leprosy control.
- Formulation of national strategic plans for TB and leprosy control.
- Publication of an annual report on TB and leprosy, focussing on annual and long-term NTLP targets.
- Technical supervision of TB and leprosy staff at regional level through the surveillance system, bi-annual and quarterly meetings, and frequent supervisory visits.
- Monitoring adherence by clinicians in hospitals and clinics to NTLP technical guidelines regarding diagnosis and treatment.
- Supporting the Pharmaceutical Services Division in monitoring the procurement and rational distribution of anti-TB and anti-leprosy medicine supplies in all health facilities.
- Participating in training of all staff on TB and leprosy control at all levels of the health system
- Maintaining active contact, coordination and cooperation with other partners and departments within the ministry, as well as institutions or sectors relevant to the control of TB and leprosy outside the MoHSS.
- Initiating and coordinating operational research on TB and leprosy.
- Advising and assisting NIP on all aspects related to the functioning of a well-accessible quality assured laboratory network for sputum-smear examination, culture and DST.
- Planning, coordination and implementation of an advocacy, communication and social mobilisation campaign on TB and leprosy, in collaboration with relevant stakeholders.
- Developing and disseminating effective patient education materials on TB and leprosy.
- Participating in resource mobilisation initiatives and preparing an annual budget for national level activities.

2. Regional level

Overall responsibility

Planning, implementation and monitoring and evaluation of TB and leprosy control in the region. The C/SHPA responsible for TB and leprosy control is functionally the Regional TB and Leprosy Coordinator (RTLC).

Functions and tasks

- Advising the District Management Teams on all aspects of TB and leprosy control.
- Advising the DTLCs and the District Management Teams on the implementation of the strategic plan on TB and leprosy.
- Conducting regular (at least quarterly) supportive supervisory visits to districts and DTLCs.
- Collecting, analysing and forwarding data aggregated by the DTLCs to national level on a quarterly basis, within 15 days after the end of the quarter.
- Organising quarterly DTLC meetings for performance monitoring and continuing education on TB and leprosy control.
- Organising and participating in training of staff on TB and leprosy.
- Developing a budgeted annual work plan based on the national strategic plan.
- Monitoring the rational distribution of anti-TB and anti-leprosy medicines in each district.
- Initiating and coordinating the implementation of operational research on TB and leprosy in the region.
- Initiating and coordinating advocacy, communication and social mobilisation activities within the region.

3. District level

Overall responsibility

Planning, implementation, and monitoring and evaluation of TB and leprosy control in the district. The nurse responsible for TB and leprosy control in the district is functionally referred to as the District TB and Leprosy Coordinator (DTLC).

Functions and tasks

- Advising the District Management Team on all matters of TB and leprosy control.
- Advising general health staff involved in TB and leprosy care in peripheral health units on all aspects of TB and leprosy management and control in line with NTLP technical guidelines and strategic plan.
- Monitoring the implementation and performance of TB treatment clinics and community-based TB care providers through monthly visits to each unit.
- Formulation of budgeted annual work plans.
- Monitoring the rational distribution of anti-TB and anti-leprosy medicines in all treatment clinics.
- Timely collecting, aggregating, analysing and forwarding of TB and leprosy data from each clinic, to the RTLC on a quarterly basis. Organising and participating in training for staff relevant for NLTP activities as to address identified needs.
- Initiating and coordinating health education activities to the community, through agricultural shows, public meetings, visit to schools.

4. Health facility

For the day-to-day execution of TB and leprosy control activities in health units at least one member of staff per health unit (preferably 2) should be properly trained and have proven competence in TB and leprosy patient management. Professional education and rank should not be major selection criteria for becoming a dedicated TB nurse. Instead, interest, attitude, motivation and communication skills are important attributes. **Frequent rotation of nurses in TB clinics must be avoided as this disrupts continuity of care, resulting in poor case management and record keeping, as well as poor treatment outcomes.**

Overall responsibility

The main responsibility of the health facility is implementation of diagnosis and treatment of TB, maintaining up-to-date records, as well as coordination and supervision of community-based TB care providers in line with NTLP technical guidelines.

Functions and tasks

- Diagnosis of TB and leprosy according to the NTLP guidelines.
- Maintaining all records for TB and leprosy suspects and patients, as well as results of contact tracing.
- Giving patient education ensuring that each patient understands all aspects of treatment
- Giving health education to the public on the signs and symptoms of TB and leprosy.
- Providing directly-observed therapy for TB patients attending for DOT at the clinic
- Issuing 2- or 4-weekly supplies of anti-TB medicines to DOT-providers (anti-TB medicines and TPT), and ensuring that the patients are receiving their treatment under supervision.
- Maintaining adequate stocks of anti-TB medicines at all times
- Recording patient attendance and medicine collection in the appropriate NTLP forms.
- Identifying patients who need urgent referral according to the NTLP guidelines.
- Tracing patients who interrupt treatment in close collaboration with CBTBC providers.
- Training and supervising CBTBC providers in the catchment area of the clinic.

6. Community Health Workers (CHWs)

This applies to all supportive staff providing education and support for TB suspects and patients (includes TB field promoters, lifestyle ambassadors, home-based care providers, and other community-based health service providers). All CHWs need to be knowledgeable on TB signs and symptoms and assist in TB control through identification and referral of patients with signs and symptoms of TB, education on TB disease of the community and screening contacts of TB patients. CHWs can play an important role as DOT providers.

Appendix 2: Health facility supervision checklist

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

HEALTH FACILITY SUPERVISION CHECKLIST

District	TB clinic
Name supervisor	Designation
Current date	Date last visit

A. NAMES OF PERSONS MET AND THEIR DESIGNATION

B. CLINIC QUALIFICATIONS			
Is (are) there dedicated TB nurse(s)?	Number:	Yes	No
If so what is/ are their name(s):			
For how long have they been doing TB work? (indicate number of months/years)			
When did s/he/'they receive their last TB case management training?			
Is there a focal doctor for DR-TB and is h/she specifically trained in the management of DR-TB in Namibia		Yes	No
Is there a focal nurse for DR-TB and is h/she specifically trained in the management of DR-TB in Namibia		Yes	No
When did s/he receive their trainings?			
Does your facility/district have a DR-TB committee?			

C. BURDEN OF TUBERCULOSIS (compare with electronic register)	
# TB patients on initial phase	
# TB patients on continuation phase	
# No of DR –TB	
# No of XDR	
# of TB patients known their HIV status	
# of TB patients tested HIV positive	
Do you have a TB Infection Control focal person?	
Total	

D. DISTRIBUTION OF TB-DOT		
# and % of patients on Health Facility-DOT (HF-DOT)		%
# and % of patients on Community-Based-DOT (CB-DOT)		%
# and % of patients on workplace (DOT)		%
# of TB Field promoters in Health Facility/clinics # CB-DOT providers in the community		
Names of organisations involved in TB Care and CB-DOT:		

E. TREATMENT OUTCOMES (new sputum smear patients in last 2 quarters)

Last 2 Q's	Registered	Cured		TC		Died		Failed		Def		Transfer		Evaluated	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%
Q															
Q															

F. PATIENT EDUCATION AND COMMUNICATION		
Does the clinic have sufficient supply of IEC materials on TB	Yes	No
On a sample of patients, is their knowledge of TB satisfactory?	Yes	No

G. RECORD KEEPING (take a sample of five TB Treatment Cards) (tick correct answer)			
TB Treatment Card	Good	Fair	Poor
Treatment cards are kept orderly and confidentially			
Treatment cards kept up-to-date			
Dosages are correct for patient weight			
Each patients receives the correct regimen			
Sputum-smears examined as required (pre-treatment /follow-up)			
Is body weight taken as required?			

DST is recorded in each patient on Cat II or MDR-TB regimen			

TB Registers (compare paper with electronic register)	Yes	No
Are all registers available: Facility/district/MDR	Yes	No
TB register up-to-date with TB Treatment Cards	Yes	No
All patients on TB-treatment are registered	Yes	No
TB patients are recorded in the correct categories	Yes	No
All patients (>10 years of age) with PTB have sputum-smear examinations done	Yes	No
Each patient has information on type of DOT (HF-DOT/CB-DOT)	Yes	No
HIV status is recorded for each patient (+/-/?)	Yes	No
Electronic TB register		
Is the data up to date and in accordance with the M&E tools	Yes	No
Are the data clerk and DTLC trained in ETR	Yes	No

H. SUPPLIES			
Anti-TB medicines	Good	Fair	Poor
Stock cards for each specific medicine present			
Each stock card is up-to-date			
Each medicine within range of minimum/maximum stock level			
Each medicines within validity period			
FEFO principle adhered to			
TB COMBI			
Do you have an ongoing TB COMBI project ? If yes, how is the progress?			
How many TB L/A are trained			
Are TB IEC material available in the local languages			
TB Laboratory Investigations			
Turn-around time DM – clinic			
Turn-around time Culture and DST			
Stock level for sputum containers			

I. LABORATORY			
Turn-Around Time of sputum specimens with 48 hours (tick)	80-100%	60-80%	< 60%
# of TB suspects examined in past quarter			
# and % of suspects examined, who are sputum-positive		#	%
# of suspects examined, who are sputum negative		#	%

# and # of suspects who are sputum negative, and have 2 sputum examination results (target >90%)		#	%
# of times External Quality Control done in past year			
Last EQC results (tick)	Good	Fair	Poor
SS examination slides kept for EQC (tick)	Good	Fair	Poor

PROGRESS SINCE PREVIOUS VISIT:

MAIN CURRENT PROBLEMS:

ON-THEJOB-TRAINING/TRAINING NEED:

RECOMMENDATIONS (EXPAND WITH ADDITIONAL SHEET WHEN NECESSARY):

SIGNATURE AND DATE (SUPERVISOR & SUPERVISEE):

Appendix 3: Standard Operating Procedures for Quarterly TB and TB/HIV Review Meetings

Introduction

These SOPs should be used alongside the National Guidelines for the Management of Tuberculosis, and definitions of terms as described in the national guidelines will be used.
In order to ensure sustainability, regions are expected to increasingly budget for these meetings as donor funding is expected to gradually decline.

Objectives of the review meetings:

- To strengthen peer review of data collected and analysed by individual districts
- To compile TB, TB/HIV, DR-TB and leprosy notification data for the previous quarter
- To compile treatment outcome data for the previous year
- To harmonize district data and share information on transferred patients among districts
- To harmonize paper-based and ETR.net data
- To present and discuss planned and unplanned activities focusing on TB, TB/HIV and leprosy performed the previous quarter
- To share challenges and solutions to challenges faced in previous quarter
- To share the latest information on TB, TB/HIV and leprosy control

Procedure

Every quarter, each region conducts a 3-day review of their TB data at a venue to be decided by the regional team. At these meetings each district will be represented by the DTLCs, PHC supervisor, facility TB nurses (from the major health facilities), environmental health officer, TB medical officer, and a representative of the community TB care providers and a data clerk if present. The region will be represented by the CHPA/ SHPA or another designated individual.
After these meetings, 5-day zonal meetings will be conducted which will bring together at least two regions, again to share their data and assist each other in cleaning and interpreting the data.

Format of Review Meetings

Presentations from districts on

- TB notification data for quarter
- TB/HIV data (all forms, HIV positive, on CTX, on ART)
- Quarterly DR-TB notification data
- Quarterly leprosy notification data
- Treatment outcome analysis for patients registered during the same quarter of the previous year
- Overview of leprosy in the districts
- Achievements and challenges on planned activities
- Suggestions to overcome challenges

Analysis of district data in groups

- Districts re-analyse their data using district registers
- Transferred-out patients within the region are sought and their outcomes recorded
- Data are finalized for each district

Format of presenting data (2-3 Slides)

- District/Regional population
- Total number of TB cases reported (new and re-treatment)
- New patients: PTB positive/ PTB negative/PTB sputum not done and EPTB
- Retreatment cases of PTB positive (relapses, return after default/failures)
- DR-TB cases (cases notified this quarter and cumulative total notified cases by district)
- (all above data can be broken down by age and sex, can use graphs/charts/figures)

Format: Outcome analysis data (2-3 slides)

- For all new smear positive PTB cases for the last quarter
- For all relapses for last quarter
- For smear negative PTB cases, PTB smears-not-done, EPTB (additional)

What to bring to quarterly review meetings: The following documents are critical and should be brought:

- District TB, DR-TB and leprosy registers
- Patient treatment cards
- Current draft quarterly reports (TB and DR TB)
- Previous quarterly reports (TB and DR TB)
- DR TB line-list
- A completed ACSM documentation format for the quarter
- An up to date ETR.net dataset
- Data on:
  - Number of health care workers diagnosed and started on TB treatment
  - Number of health care workers trained on any aspect of TB control in the quarter
  - Status of implementation of TB-IC by district

Implementation of planned activities

- Present what was planned and what was done
- Why some planned activities were not carried out?
- What were the successes and what were failures, and why?
- What are the plans for PMDT at regional and district levels?
- The cost of each activity and source of funding should be reported.

Responsibility

- The DTLCs should ensure that district data are cleaned and corrected before the end of the zonal review meetings
- The DTLCs should ensure that data are collected from different sources
- Funding proposals should be submitted to the national office by the hosting region three weeks in advance
- C/SHPAs from all 13 regions should ensure that these SOPs are adhered to and that the conduct of quarterly review meetings shows consistency
- Verified and signed copies of quarterly reports should be submitted to national level at most within 72 hours of concluding a zonal review meeting
- The C/SHPA and the DTLCs should make copies of the submitted quarterly reports available to the Chief Medical Officers at Regional level and the Principal Medical Officers at district level respectively (within one week of concluding a zonal review meeting).
- The region responsible for hosting the zonal meetings should ensure that review meeting reports are submitted to the Chief Medical Officer at the end of each zonal review meeting (maximum, one week post review meeting)

Appendix 4: Sample Infection Control Plan for Preventing Transmission of Tuberculosis

Name of facility: _____District:_____

Infection Control Committee	Name of representative
Infection Control Committee Chair	
Infection Control Lead Person (ICP)	
Infection Control Committee Members • Nursing Services • Radiology • Laboratory • DTLC • ARV Clinic Represenative • Other departments/units	

The committee meets on the _____ of each month and updates on TB Infection Control are a standing agenda item.

BACKGROUND STATEMENT:
_____hospital/clinic is a health facility that serves patient in _____District, of _____ Region. _____ Region has a TB incidence of ____:100 000 compared to national incidence of ____:100 000. We provide the following services: _____, _____, _____, and _____. In the year _____ the facility had _____ TB patients. Of these, _____ were smear-positive, _____ were smear-negative, and _____ were extra-pulmonary. Of these were _____ retreatment cases, _____ were found to have MDR-TB and _____ had XDR-TB. From all the TB patients, _____ had a known HIV status and _____ tested HIV positive. Of these _____ are on ARV treatment. TB diagnostic services available on site are _____ and _____.

PURPOSE:
The infection control plan outlines strategies to identifying, separating, appropriate treatment and other measures to reduce the risk for TB transmission to patients and health care workers.

AUTHORITY STATEMENT:
The designated Infection Control Lead Person shall have the authority to assess, implement and ensure compliance with this plan for all clinical sites. The signatures of both the Health Facility Manager and Infection Control Committee Chair on the last page of this document give authority and responsibility to the designated ICP.

RESPONSIBILITY:
The facility Infection Control committee has the authority to adapt the plan as needed to maintain the safety and health of patients and staff members.
The Infection Control Person, with the support of the facility administration and Infection Control Committee ensures that the facility consistently follows the practices as outlined below:

Managerial Controls

The Infection Control Lead person will:
1. Monitor implementation of infection control practices on a daily basis.
2. Conduct TB IC training sessions for all staff.
3. Ensure that the written Infection Control (IC) plan will be available to all staff and more often if deemed necessary and display the plan in clinical areas.
4. Provide information and IEC materials on TBIC for all patients and visitors.
5. Perform a TB IC Risk Assessment and Analysis with a performance improvement plan at least annually.

Administrative Controls
In order to reduce the risk of TB transmission for both employees and patients the following TBIC practices will be implemented at our facility. Person(s) responsible for the activities are;

Activity	Name of person responsible
Ask all clients for cough upon entering the facility	
Educate all patients and clients on cough etiquette and hygiene	
Provide tissues or face masks to all coughing patients and clients	

Clients who cough will be asked to dispose of tissues or mask using bins provided.	
Clients who cough will be directed to a special waiting area or fast tracked and will be seen first	
Explain the queuing system all clients and patients	
The professional nurse (or nurse staffing the service) will periodically scan the queue for coughing clients.	
TB suspects will promptly be investigated for active TB disease	
Processing of sputums will be expedited to the lab. There will be a tracking mechanism to monitor-turn-aruond time of lab results and regular meetings with lab staff.	
Display posters and provide IEC material on TB IC to all patients and clients	

Environmental Controls

Certain environmental controls have been identified to decrease the risk of TB transmission in the facility.

Activity	Name of person responsible
Direction of air flow in each consultation room will be established and marked with a sign.	
HCW should sit with the clean air moving from behind them towards the client.	
Windows or doors will be opened to ensure maximum air flow.	
Signage will be placed to remind HCWs to keep windows and door open	
Fans will be located in appropriate areas (consultation rooms and/or waiting areas) and be operational	
Regular cleaning and maintenance will be performed on all environmental controls and records kept	

Personal Protective Equipment (PPE)

Personal Protective equipment when used in tandem with other IC strategies can also reduce the risk of TB transmission to staff and other within the facility.

Activity	**Name of person responsible**
Fit testing will be done to all health care workers wearing a N95 respirators	
N95 respirators will be available in consultation rooms for HCWs.	
N95 respirators will be used by all HCW working in high risk areas or attending to DR-TB patients	
Offer confidential HIV counselling and testing to HCWs	
Offer ART and TPT prophylaxis to all eligible HCWs	
HIV infected staff will be reassigned if they request	

_____ _____ _____

Signature and date **Signature and date**

Health Facility Manager **Infection Control Committee Chairperson**

Appendix 5: Side-effects of first line anti-tuberculosis medicines

Although most TB patients complete their treatment without any significant medicine side-effects, all patients must be monitored during treatment. Severe adverse medicine reactions are more common in HIV-positive TB patients. Health staff should educate patients on how to recognise symptoms of common side effects and report if they develop such symptoms, and by asking about symptoms when patients report for medicine collections. Significant side effects should be reported to the TIPC (see *Appendix 6*).

Second-line anti-TB medicines are more toxic and less efficacious than the first-line medicines. All physicians should be aware of the main side-effects of these medicines before prescribing to a patient. When serious side-effects arise, clinicians must report to the TIPC.

Decisions to modify second-line anti-TB treatment regimens must be made in consultation with the CCRC.

Isoniazid *(H or INH)*

Contraindications

Known cutaneous or hepatic hypersensitivity reaction.

Active hepatic disease.

Precautions

Monitoring of hepatic transaminases in patients with pre-existing chronic liver disease.

All patients should receive pyridoxine for prevention of peripheral neuropathy.

Medicine interactions

Consider reducing the dosage of carbamezipine and phenytoin in the treatment of patients with epilepsy.

Concomitant aluminium hydroxide decreases the absorption of INH.

Pregnancy

INH is safe in pregnancy.

Minor adverse effects

Mild itching: generally responds well to anti-histamines. In HIV-positive patients, however it can develop quickly into a serious cutaneous reaction.

Some increase in serum levels of hepatic transaminases at the onset of treatment usually resolves spontaneously during treatment, and without clinical significance.

Major side-effects

Cutaneous hypersensitivity reactions during the first weeks of treatment.

Peripheral neuropathy (tingling and numbness of the hands and feet): This is the main adverse effect of INH, common in malnourished patients and with high doses. Peripheral neuropathy is treated with pyridoxine 100mg daily until symptoms disappear, then continue with 25mg daily to prevent recurrence.

Hepatitis is rare. When it occurs stop INH immediately.

Less common are: optic neuritis, toxic psychosis, generalised convulsions, developing during the later stages of treatment in susceptible individuals.

Rifampicin (R or Rif)

Contraindications

Known hypersensitivity to rifampicin

Hepatic dysfunction

Precautions

Women using oral contraceptives are advised to use an oral contraceptive with a higher dose of estrogen (50µg) or a non-hormonal barrier method.

Serious immunological reactions resulting in renal impairment, haemodialysis or thrombocytopenia may occur in patients who resume taking rifampicin after a prolonged interruption of treatment. In this rare situation, it should be immediately withdrawn.

Monitor liver function in the very elderly, in patients who have hepatic disease, and in those with alcohol dependence.

Warn patients that rifampicin can cause reddish coloration of urine, tears, saliva, and sputum (contact lenses can be irreversibly stained).

Vitamin K should be administered at birth, to the newborn of a mother treated with rifampicin to prevent the occurrence of postnatal haemorrhage.

Medicine interactions

Rifampicin induces hepatic enzyme function which may breakdown other medicines more rapidly than normal, and may increase dosage requirements of all medicines metabolised in the liver: e.g. corticosteroids, oral contraceptives, oral hypoglycemic agents, oral anticoagulants, phenytoin, cimetidine, cyclosporine and digitalis glycosides.

Rifampicin decreases the serum levels of antiretroviral medicines of the NNRTI and PI groups.

Biliary excretion of radiocontrast media and sulfobromophthalein sodium may be reduced and microbiological assays for folic acid and vitamin B12 disturbed.

Pregnancy

Rifampicin is safe in pregnancy.
Minor adverse effects
Generally well tolerated by most patients, in recommended dosages.
Reddish coloration of tears, saliva, sputum, urine.
Moderate rises in bilirubin and serum transaminases are common at the onset of treatment, but are usually transient and without clinical significance.
Gastro-intestinal intolerance (nausea, vomiting) are quite common. Advise the patient to take the medicines at bedtime or after a meal.
Major side-effects
Influenza-like syndrome, fever, malaise, bone pains and thrombocytopenia may occur after prolonged interruption of rifampicin treatment (see above).
Exfoliative dermatitis (Stevens-Johnson syndrome) is more common in HIV+ persons. Stop rifampicin immediately and select alternative treatment.
Medicine induced hepatitis. Rifampicin must be stopped immediately and an alternative medicine should replace rifampicin.

Pyrazinamide (Z or PZA)
Contraindications
Known hypersensitivity to pyrazinamide.
Severe hepatic dysfunction.
Precautions
Patients with diabetes should be monitored carefully since blood glucose levels may become labile.
May cause or exacerbate gout.
Pregnancy
Pyrazinamide is safe in pregnancy.
Minor adverse effects
Generally well tolerated by most patients, in recommended dosages
Gastrointestinal intolerance (nausea, vomiting) is quite common. Advise the patient to take the medicines at bedtime or after a meal.
Some patients complain of light flushing of the skin
Moderate rises in bilirubin and serum transaminases are common at the onset of treatment, but are usually transient and without clinical significance.
Asymptomatic hyperuricaemia may occur.
Pain in joints (mostly shoulders and knees) may occur and responds generally well to treatment with analgesics, especially aspirin.
Major side-effects
Gout develops occasionally. This requires treatment with allopurinol.

Ethambutol (Abbr. E or ETH)
Contraindications
Known hypersensitivity to ethambutol
Pre-existing optic neuritis from any cause
Creatinine clearance of less than 50ml/minute
Precautions
Patients should be advised to discontinue treatment immediately and to report to a clinician if their sight or perception of colour deteriorates.
If possible, renal function should be assessed before treatment.
Respect maximum dose for adult and children of 15mg/kg BW in daily treatment.
Pregnancy
Ethambutol is safe in pregnancy and should be used as first choice medicine for TB treatment.
Children
Ethambutol is safe in treatment of children provided maximum daily dose of 25mg/kg is not exceeded.
Minor adverse effects
Early and mild changes in visual acuity and colour vision may occur and are reversible if ethambutol is stopped immediately.
Signs of peripheral neuropathy occasionally develop in the hands and feet. Treat with pyridoxine 100-200mg daily until symptoms disappear, then continue with 25mg daily.
Major side-effects
Blindness may develop if ethambutol treatment is not stopped immediately when mild and early changes in visual acuity and colour vision occur.

Appendix 6: Safety Yellow Form for reporting ADRs and medicine use/product problems

Republic of Namibia
Ministry of Health and Social Services

For reporting ADRs and medicine use /product problems

A. Patient Information **TIPC**			
Patient identifier(initials/code)		*Sex*	*M_____F_____*
Age at the time of event		*Weight in kgs*	

B. Adverse Event/Product problem/Error (*tick where appropriate*)

1. Event/Reaction		**2.Type of Event/Reaction**	
Event/Reaction to ARV/TB/ACT/New medicines/Product		*Adverse Event*	
Serious events with other medicines/Products		*Product problem (e.g. defects/malfunctions)*	
		Product use error (e.g. medication error)	

3. Outcomes attributed to adverse event (tick where appropriate)			
Death (Date:_____/_____/_____)		*Disability or Permanent damage*	
Life-threatening		*Congenital anomaly/ Birth defect*	
Hospitalisation/prolonged hospital stay		*Other serious (important medical events)*	
Required intervention to prevent permanent impairment/damage e.g. use of devices		***4. Date of the Event***	
		5. Date of this report	

6. Describe the Event, Product problem or Product use error and Actions taken

7. Relevant tests/Laboratory investigations done (include dates)

8. Other relevant history, including pre-existing medical conditions (allergies, pregnancy, smoking, alcohol use, liver, kidney problems, race etc)

C. Suspect Product (obtain as much information as possible from product label/packaging)

Name		*Dose/amount*	
Strength		*Frequency*	
Manufacturer		*Route*	
Date of use (From/to or best estimate of duration):			
Event stopped after stopping use? (Yes/No)		*Event stopped after dose was reduced?(Yes/No)*	
Event reappeared after reintroduction (Yes/No)			
Lot number		*Expiry date*	

D. Other products taken by the patient within the last 3 months prior to the reaction

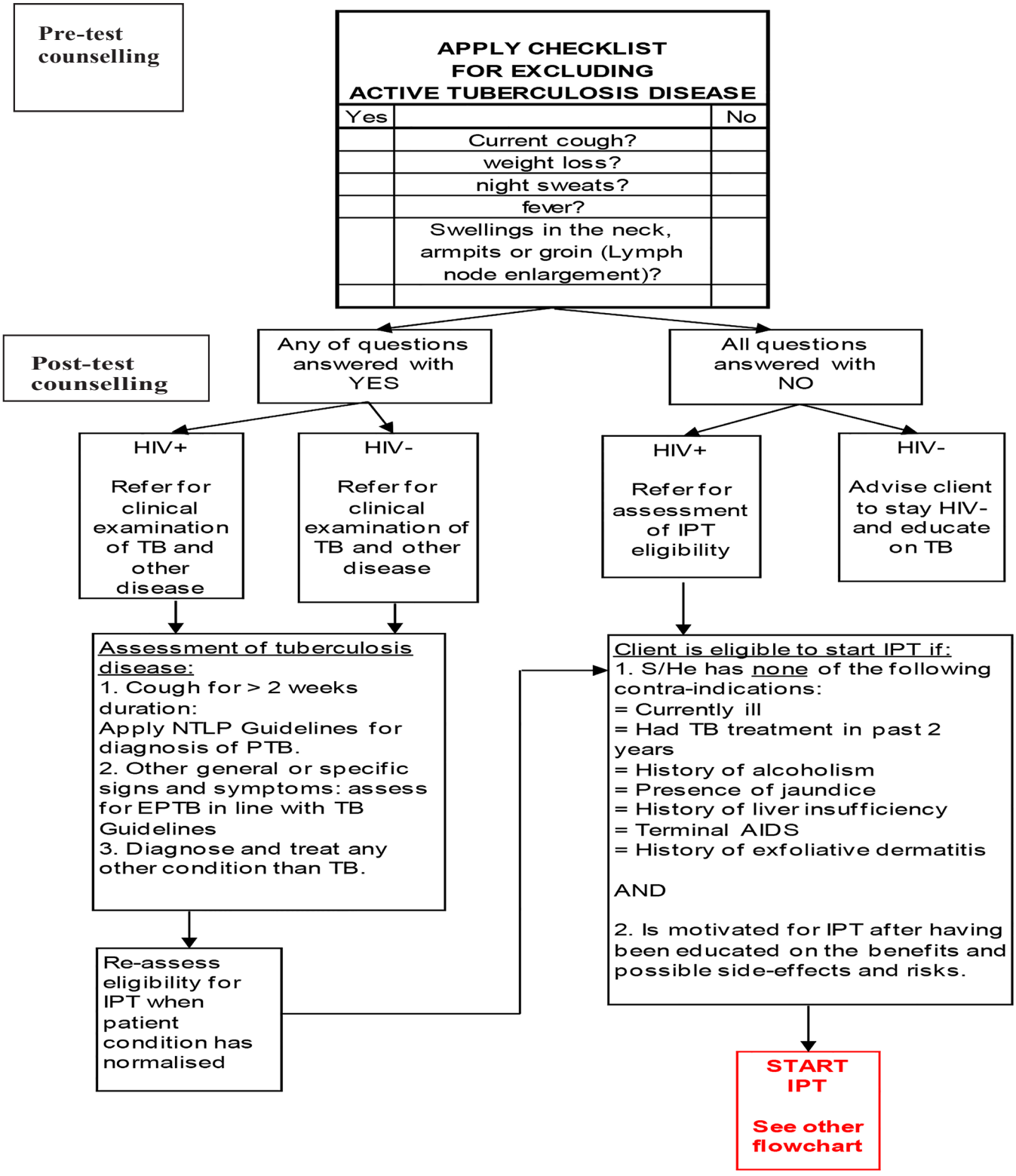
Product name 1		*Product name 3*	
Dosage and dates		*Dosage and dates*	
Product name 2		*Product name 4*	
Dosage and dates		*Dosage and dates*	

E. Information about the reporter

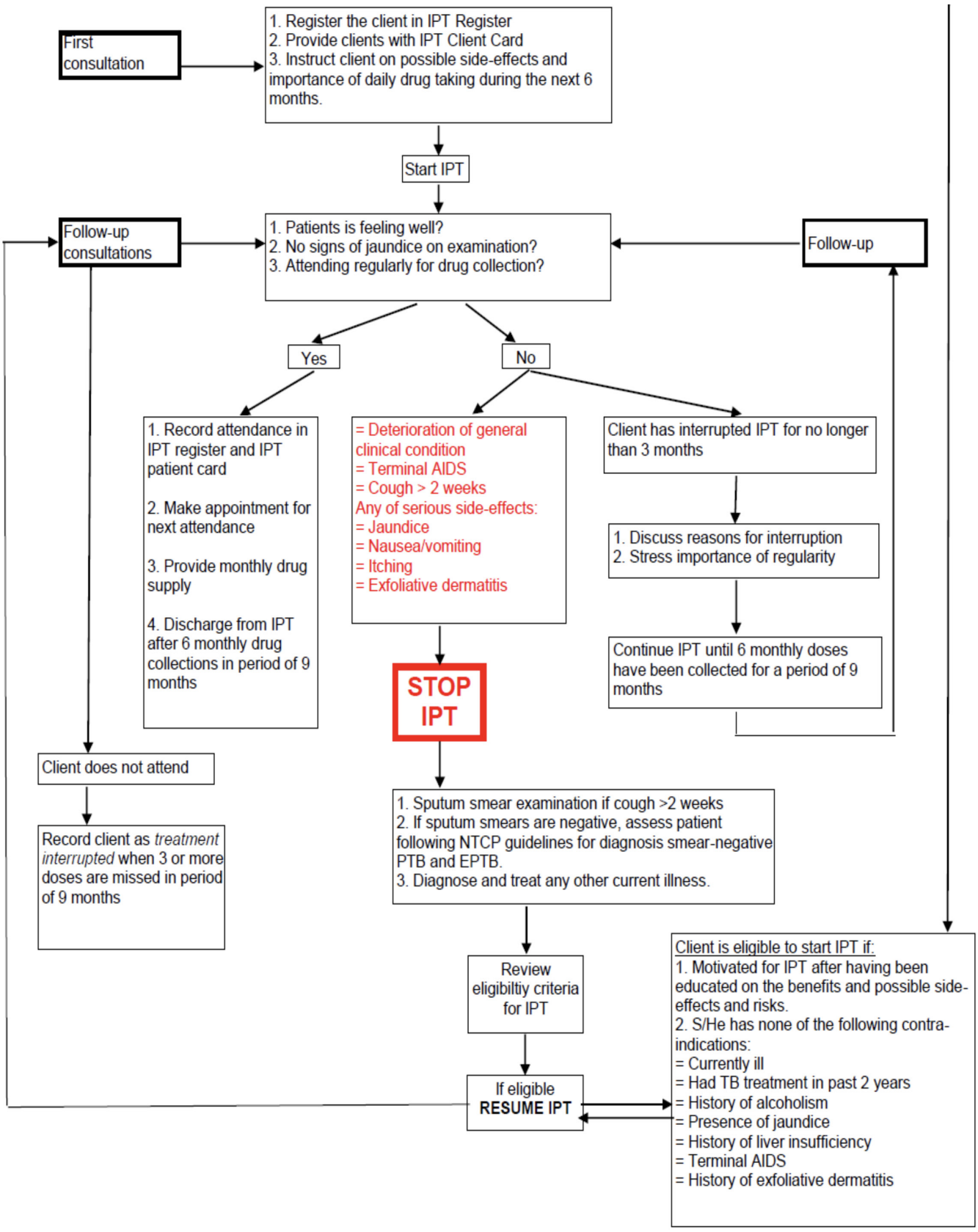
Names		*Profession*	
Telephone		*Fax*	
Region		Email	
Health Facility			

Send/ Fax the completed form to the Therapeutics Information and Pharmacovigilance Centre: Room 21, Basement Area, Windhoek Central Hospital; Tel: 061 203 2312; Fax: 061 226 631

Appendix 7: Tuberculosisi screening algotithm in HIV testing and care settings



Appendix 8: Algorithm for the commencement and follow-up of clients on isoniazid preventive therapy



NAMIBIA INSTITUTE OF PATHOLOGY LIMITED

Tel: +264-61-295 4200 • Fax: +264-61-233 285 • P.O. Box 277 • Windhoek • Namibia
Practice No: 052 / 000 / 5201438 • Practice No: 075 / 005 / 0148377

REQUEST FOR BACTERIOLOGICAL EXAMINATION FOR TUBERCULOSIS

Patient's Surname: _____ Patient's First Names: _____

A

Referring Doctor Surname and Initals		Practice no.	**URGENT** (please tick if urgent) ☐
Copies to Dr/s	Hospital Clinic	ICD 10:	
Ward:		File no.	*Contact Person* _____
Paient ID Number:		Sex (circle) M F	*Tel No* _____
Nationality:		Date of Birth	*Fax No* _____
Patient's TB number:	District		Region:
Patient's / Relative's telephone no(s)			
Patient's physical address:			Patient's signature: _____

Reason for testing (tick one): ☐ Diagnostic ☐ Follow-up (during treatment for TB)

B

Patient Identifier:	TB	1st Specimen Collection date	Time
NIP Lab Number	Affix laboratory barcode label here	2nd Specimen Collection date	Time

C

Patient previously treated for TB? (tick one): ☐ No (never treated for TB) ☐ Yes (previously treated for TB) ☐ Unknown

If previously treated, outcome of the most recent episode: ☐ Cured or completed ☐ Lost to follow up ☐ Treatment Failure ☐ Unknown

Year of this outcome: ☐

Any other history of exposure (tick all that apply)

☐ Contact with presumed susceptible TB patient ☐ Contact with known DR - TB patient ☐ Smoking

☐ Previous hospital admission ☐ Previous work in health care settings ☐ Use of alcohol

☐ Immunosuppression ☐ Previous incarceration (prison, police cells) ☐ Other risk, specify: _____

Previously received prophylaxis for TB (IPT) ☐ Yes ☐ No if yes, when was most recent intake (year) ☐

D

Type of specimen (tick one): ☐ Sputum ☐ Other (specify) _____

Specimen (tick one): ☐ 1st specimen ☐ 2nd specimen

Test requested (tick all that apply): ☐ DM ☐ Xpert MTB/RIF ☐ LPA ☐ LPA 2nd line STS ☐ MOTT ID LPA ☐ Culture ☐ C/1st line DST ☐ 2nd line DST

If taken during treatment, in what month is it? ☐ 0 Month ☐ 2nd Month ☐ 3rd Month ☐ 5th Month ☐ 7th Month ☐ 8th Month ☐ Other _____ (specify in months)

E

Name and signature of person requesting examination:

FOR LABORATORY USE ONLY

F

Laboratory Reception	**Received:** _____	**Date:** _____	**Time:** _____
	Logged by: _____	**Check logged by:** _____	**Container type:** _____

Appendix 10: Central Clinical Review Council Consultation Sheet

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

A) History and Clinical Examination

Site/Hospital	
Doctor and Contact Details	
District TB Coordinator and Contact Details	
Patient Name, Age and Sex	
Diagnosis	
Problem(s)	
HIV Status, Latest Cd4 & ART Regimen	
Medical History	
TB History (Date/Year, Initial Rx / Retreatment, Duration & Outcomes, Include any Side Effects)	1. 2. 3. 4.
TB History (2nd Line) (Actual Medicines, Duration Dates if Possible, Include any Side Effects)	
Examination Findings & Chest X-ray	
Current Sputum (Date Taken, DM, Culture, DST)	
Other Investigations Done	
Current Treatment (TB & Other –Include Side Effects)	
Proposed Treatment (By District/Regional Team)	
Social Considerations (Problems and how they are Being Addressed) Assessed by Social Worker (Y/N).....	Dot (Y/N)..... Name of Provider/Organisation.....

B) Sputum Examination Chart

Date Taken	Dm-Insert Worst: *Neg/+/++/+++* (and date received)	Culture *Mtb/Mott/ Neg6wk/Neg2wk*	Resistant: *H/R/S/E Km/Ofx/Eto*	Susceptible *H/R/S/E Km/Ofx/Eto*

H=Isoniazid, R=Rifampicin, S=Streptomycin, E=Ethambutol, Km=Kanamycin, Ofx=Ofloxacin, Eto=Ethionamide

Close Contacts with Known or Suspected DR-TB Case? Yes / No

Name of Contact	Resistance Pattern

Additional Comments/Information (continue on additional sheet if necessary)

.....
.....

……

Person Reporting: ..

Fax Number:..... Date.....

TB 01: Sputum Examination Register

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Serial number: 9-0/0025 | Month: _____ | Year: _____

No.	Name	Surname	Sex	Date of birth *(dd/mm/yyyy)* / Age *(in years)*	Nationality	Patients' physical address *(1)* / Patients' phone number	Next of kins' physical address / Next of kins' phone number	Referred from *(2)* / Risk Category *(write in all applicable)* *(3)*	Patient lab form number	Date of sputum collection *(dd/mm/yyyy)* / Date sputum sent to lab *(dd/mm/yyyy)*	Result *(4)*	Date received *(dd/mm/yyyy)* / Time *(hh:mm)*	TAT *(In days)* *(5)*	HIV *(6)* / HV Result *(7)*	ART *(8)*	Comment *(9)*

Version 2018.1

(1) Write a complete address that can help you to trace the patient when sputum results are positive.

(2) Referred from: (1) = Private, (2) = Self, (3) = CBTBC/CSO, (4) = Public, (5) = TIMS Centre, (6) = Police Holding Cells, (7) = NCS

(3) Risk category : (1) = Congregate settings, (2) = HCWs, (3) = Children, (4) = Nomadic /Seminomadic population, (5) = Miner, (6) = Ex-miner, (7) = Family member of miner, (8) = Family member of ex-miner, (9) = Diabetic, (10) = Informal settlement, (11) = HIV+

(4) Results codes: (1) = No MTB, (2) = MTB RifR, (3) = MTB RifS, (4) = Insuf, (5) = MTB rif,indeterminate (6) = Eror, (7) = DMpos, (8) = DMneg, (9) = Other test done

(5) TAT: Tum-around-time; write the number of days elapsed between the date specimens were sent to the lab and date results were received.

(6) HIV status: (1) = Known HIV status; (2) = HIV test done at TB diagnosis; (3) = Not tested

(7) HIV Result: (1) = Positive, (2) = Negative, (3) Unknown/Not tested

(8) ART: (1) = Already on ART, (2) = Initiated on ART, (3) = Not on ART

TB 02: TB Laboratory Register

National Tuberculosis and Leprosy Programme
Laboratory TB Register

Name of Laboratory:

Serial number	Patient Identifier - Request Form	Referring health facility	Reason for examination Diagnostic=D Followup=F	Patient			Specimen 1				Specimen 2							Comments	Name & Signature
				Surname	First name (s)	Age (years)	Lab Requisition No.	Date received	Xpert Result (No MTB / MTB+Rif resistant/ MTB+Rif sensitive/ /insufficient	DM Result (Neg/Scanty/1+/ 2+/3+)	Referred to WCR TB Lab? (Y/N)	Lab requisition No.	Date received	Line Probe Assay Result (LPA)	Culture Results (NG6W/MTB/ Contam)	1st Line DST Results	2nd Line DST Results		
1									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
2									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
3									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
4									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
5									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
6									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
7									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
8									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
9									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		
10									NO MTB MTB RIF R MTB RIF S INSUF OTHER	NO AFB POS SCANTY 1+ 2+ 3+				MTB Y N FQN S R INJEC S R	MTB NG6W CONTAM MOTT OTHER	RIF S R INH S R STREP S R ETHAM S R	FQN S R INJEC S R		

*FQN=fluoroquinolone (ofloxacin, levofloxacin or moxifloxacin)
INJEC=Injectable (kanamycin, amikacin, capreomycin)

Version 2016.1

Effective Date: January 2017

TB 03: Tuberculosis Treatment Card

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Health facility name:		Health facility code:	District:
Patient NAME:		Patient SURNAME:	Reg No:
Date of birth:	Age:	Sex: ☐ Female ☐ Male	Nationality:
Occupation (current or previous):		Risk category (1)	Phone number:
Physical address:		Diagnosed from: Public/Private (TICK)	Referred from (2):
Name CBTBC organisation:		Name(s) DOT provider(s):	DOT Code:

DOT code: (1) Health facility (2) Workplace (3) Community Health Worker (4) Guardian, neighbour, close relative (5) Other

DIAGNOSTIC CLASSIFICATION

		PTB			*EPTB (Specify)*		
		Bacteriologically positive	Bacteriologically negative	Sputum not tested	Bacteriologically positive	Bacteriologically negative	Specimen not Done
New							
Previously treated	Relapse						
	TAF						
	TALFU						
	ULO						
Unknown treatment history							

If previously treated number of treatment episodes (4): _____ Year of most recent treatment outcome:_____

PRE-TREATMENT RESULTS

Test	Diagnostic specimen *(tick)*		Result *(tick all applicable)*						Date
	Sputum	Other *(Specify)*							
Xpert *(mandatory)*			No MTB	MTB/Rif Sen.	MTB /Rif Res.	MTB/ Rif indeterminate	Xpert error results	Xpert not done	
1st line LPA *(if performed)*			No MTB	MTB detected	☐Rifampicin Sen. ☐Rifampicin Res.		☐INH Sen. ☐ INH. Res.		
2nd line LPA *(if performed)*			No MTB	MTB detected	☐ FQN Sen. ☐ FQN Res.		☐Inject. Sen. ☐ Inject. Res.		
Culture *(if performed)*			NG6W	MTB	MOTT	Contaminated	Other		
DST *R=Resistant*			**R**	**H**	**E**	**S**	**Km**	**Lfx**	
DST *S=Sensitive*			**R**	**H**	**E**	**S**	**Km**	**Lfx**	
Histology *(if performed)*									

HIV STATUS AND ANTI-RETROVIRAL THERAPY

HIV status: ☐ Known HIV status ☐ HIV test done at TB diagnosis ☐ Not tested	**Result:** ☐ Positive ☐ Negative ☐ Not done		Date tested:
ART: ☐ Already on ART ☐ Initiated on ART ☐ Not on ART	HIV Unique No: _____- _____ - _____		Date initiated:
ART regimen- Before TB treatment: After initiating TB treatment:	**CD4 count:** Latest CD4 count: Date:	**Partner HIV Status** **Known:** ☐ Yes ☐ No	**Partner tested:** ☐ Yes ☐ No
Patient Received TPT before: ☐ Yes ☐ No	If TPT received , most recent year:		
CPT: ☐ Yes ☐ No	Diabetic: ☐ Yes ☐ No ☐ Unknown	Tested now: *(write result)*	Date tested:

Transfer in ☐ Date of diagnosis:…… On TB treatment: Yes / No *(please circle)*

Date TB treatment started: …… ….. Date treatment ended:……
Date moved to DR TB register: ……

ANTI-TB THERAPY AND OTHER MEDICINES																										
Standard 1st line regimen (2RHZE/4RHE) *Initial phase (2 months) Medicines R H Z E, continuation phase (4 months) Medicines R H E*																										
Modified 1st line regimen *(Please tick applicable medicines below*	initial phase (……..months)										continuation phase (…….months)															
Medicines in modified 1st line regimen	R	H	Z	E	S	Lfx	Eto				R	H	Z	E	S	Lfx	Eto									

TREATMENT MONITORING

Timing	Smear result	Culture result *(if done)*	Date	Weight (kg)	Date
O Months					
2 months					
3 months					
5 months					
7 months					
Other					

INITIAL PHASE OF THERAPY

Medicine & Dosage	Adult [RHZE] - FDC		R 150mg		R 450mg		H 300 mg		E 400mg		S inj. mg			
	Child [RHZ] - FDC		Z 400mg		Pyridoxine 25mg		H 100mg		E 100mg		Cotrimoxazole 480mg			

Month/ day	*Sign with initials for date of DOT or date medicines are collected. Draw a horizontal line for dates that TB medicines are taken as DOT or Self Administered Treatment (SAT) at home*																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

CONTINUATION PHASE OF TUBERCULOSIS CHEMOTHERAPY

MEDICINES AND DOSAGE	ADULT FDC-[RHE]-		H 300mg		Pyridoxine 25mg	
	CHILD FDC-[RHE]		H 100mg		Cotrimoxazole 480mg	
	R 450mg		E 400mg			
	R 150mg		E 100mg			

Month/ day	*Sign with initials for date of DOT or date medicines are collected. Draw a horizontal line for dates that TB medicines are issued for community-based DOT.*																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

TB TREATMENT OUTCOME AND DATE *(tick and indicate date of outcome)*

Cured	Treatment completed	Treatment failed	Died on Rx	Died before Rx	LTFU before Rx	LTFU on Rx	Not evaluated	Moved to DR TB register

PATIENT SUPPORT AND REHABILITATION

Socio-economic Status (SES) Assessment done: Yes | No	Date assessed	Assessment outcome				
Eligible for social grant: Yes | No	Date submitted	None-N	Social Security Sick Leave-**SSSL**	Disability Grant- **DG**	Children Allowance- **CA**)	Any other socio-economic assistance ***(specify)***
Assessment for functional or physical disability: Yes | No	Date assessed	Assessment outcome				
Assessed for catastrophic costs Yes | No	Date assessed	Facing catastrophic cost *(total cost of TB treatment and out of pocket payment is more than 20% of annual household income)* Yes | No				

LIST OF CLOSE CONTACTS AND ACTION TAKEN

No.	Name & Surname	Age	Contacts screened *(Yes/No)*	Symptoms *(0 = symptom absent, 1 = symptom present)*					Contact diagnosed with active TB *(Yes/No)*	Contacts started on TB treatment *(Yes/No)*	HIV status: *(Known /Unknown)*	TPT initiation *(Yes/No)*
				C	WL	NS	F	LN				

PATIENT EDUCATION VERIFICATION

Tick in the columns whether the patient has a good understanding of the questions asked and what it means to him/her.	At beginning of Intensive phase			At end of Intensive phase			Other time			At end of treatment		
	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good
What is the disease you have?												
How is this disease spread?												
What can you do to avoid infecting others?												
What medication will you take?												
How long will you need to be on medication?												
Why is it important that you never forget to take all the drugs each day?												
Can TB be cured?												
When and why is it important to provide sputum samples for testing?												
Are TB and HIV/AIDS the same? Explain												
Why is it important to know your HIV status when you have TB?												
How can you benefit from knowing your HIV status?												
Why is it important to have a DOT supporter?												
Why it is important to provide your physical address details and update it as needed												
What are common side-effects and what can you do about them?												
Which are serious side-effects that must make you come to the hospital immediately?												
What are “close contacts”?												
Why is it important to inform your close contacts that you have TB disease, and to use the TB contact Card?												
Can you get TB disease again?												
What should you do when you get the same disease symptoms after you have been cured?												
What should you do when you meet somebody who has been coughing for more than 2 weeks?												
Signature												
Date												

Clinical notes

……

……

……

……

……

……

……

……

……

Treatment monitoring (insert results and date)

Timing	Smear	Culture	Date	Weight	Date
0 months					
2 months					
3 months					
5 months					
7 months					
Other					

Number of close contacts		Number of close contacts screened	
Number of close contacts on TPT		Number with active TB	

Remarks

……
……
……
……
……
……
……
……
……
……

TB.04 TB Patient Identity Card

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Registration No.						
Name: SURNAME:						
Sex: AGE (years):						
Date of Birth:						
Physical address:						
Phone number:						
Health Facility: District:						
DOT provider's name:						
PTB	Bac. +ve		EPTB	Bac. +ve		SNT
	Bac. -ve			Bac. -ve		
Pre-treatment result:						

Regimen:	Date started	Date ended
Standard regimen: 2RHZE/4RHE		
Modified first line:		
Date moved to DRTB register:	DST results:	

Treatment outcome:	Date:

INTENSIVE PHASE

(Only mark date when daily medicines were taken)

TB 05: TB Patient Identity Card …. (Cont)

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49
50	51	52	53	54	55	56
Extended initial phase:						
57	58	59	60	61	62	63
64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84

MEDICINES AND DOSAGES

Pre-Treatment Bodyweight	kg

Adult FDC [RHZE]		R 150/450mg	
Adult FDC [RHE]		H 100/300mg	
Adult FDC [RH]		Z 500mg	
Child FDC [RHZ]		E 400/100mg	
Pyridoxine 25mg		Streptomycin injection	
Co-trimoxazole 480mg		Cycloserine 250mg	
Ethionamide 250 mg		Levofloxacin250mg	
PAS 4g sachets			

CONTINUATION PHASE

Medicine collections

(write date when medicines were collected)

Collection date:	Collection date:	Collection date:	Collection date:	Collection date:
Collection date:	Collection date:	Collection date:	Collection date:	Collection date:
Collection date:	Collection date:	Collection date:	Collection date:	Collection date:

Sputum smear examinations (months from starting treatment)

0	2	3	5	7

Remarks

……

……

……

TB 04: Facility Tuberculosis Treatment Register

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Year----------

Reg. No	Name	Surname	Sex	Date of birth *(dd/mm/yyyy)* Age *(in years)*	Physical address	Patient Phone number Next of kin Phone number	Nationality	Current Occupation Previous Occupation	Risk category *(list all applicable) (1)*	Referred from *(2)*	Date of diagnosis *(dd/mm/yyyy)*	Pre-treatment results *(3)* Xpert / DM / Culture	Date of registration *(indicate "TI" if transferred in)*	Patient category *(4)*	Bacteriological classification *(5)*	Disease site *(PTB / EPTB)*	Date treatment started *(dd/mm/yyyy)*	Treatment regimen *(6)*	Name of health facility where patient is treated

N - New patient **R** – Relapse patient; sputum-smear positive, **F** = Treatment after Failure; **D** = Treatment –after-default, **TI** – Transfer In; patient referred from other treatment clinic; **O** – Other: please specify (includes smear negative or EPTB retreatment cases, unknown previous history).

TB 05: Facility Tuberculosis Treatment Register…. (Cont)

Treatment monitoring *(result and date)*					Date of medicine collection *(dd/mm/yyyy)*									HIV status *(7)*	ART *(9)*	Random blood sugar level	CPT (10) *(dd/mm/yyyy)*	DOT Option *(11)*	Diagnosed from *(12)*	No. of close contacts identified	No. of close contacts screened	No. of close contact investigated	No. of close contacts diagnosed with TB	Functional or physical disability assessment *(Y/N)*	Clinically significant hearing loss at end of RX *(Y/N/NA)*	Baseline assessment of socio-economic status (Y/N)	Eligible for social grant *(Y/N)*	Type of grant given *(13)*	Assessed for catastrophic cost *(Y/N)*	TB treatment outcome *(14)*
2 months	3 months	5 months	7 months	Other	Date	Date	Date	Date	Date	Date	Date	Date	Date	HIV result *(8)*	Date of initiation	Diabetic *(Y/N)*														Facing catastrophic cost *(Y/N)*	Date

Xpert – (+) if M.tb is detected on Xpert MTB/RIF ; (-) if M.tb is not detected on Xpert MTB/RIF, or (ND) if Xpert MTB/RIF test is not performed. Cured – sputum-smear negative **TC** – Treatment completed (no smear) **Died** – patient died from any cause **Failure** – Sputum positive at 5 or 7 months, or changed to second line therapy before 5 months **Defaulter** – Interrupted treatment for 2 months **Transfer Out** – Patient moved to another clinic, no outcome known **HIV** – Code 1 = pos; 2 = neg; 3 = unknown **CPT**- insert date of commencement, **ART**-insert date of commencement
Indicate **CB-DOT** code: (1) Guardian (relative, neighbour); (2) Workplace; (3) Health facility; (4) Community Health Worker; (9) Other

TB 05: District Tuberculosis Register

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

YEAR:_____

Reg. No	Name	Surname	Sex	Date of birth *(dd/mm/yyyy)* **Age** *(in years)*	Physical address	Patient Phone number **Next of Kin Phone Number**	Nationality	Occupation Previous **Occupation Current**	Risk category *(list all applicable) (1)*	Referred from *(2)*	Date of diagnosis *(dd/mm/yy)*	Pre-treatment results *(3)*			Date of registration *(indicate in red "TI" if transferred in)*	Patient category *(4)*	Bacteriological classification *(5)*
												Xpert	**DM**	**Culture**			

(1) Risk category - 1. Congregate settings, 2. HCWs, 3. Children, 4. Nomadic/Seminomadic population, 5. Miner 6. Ex-miner, 7. Family member of miner 8. Family member of ex-miner 9. Diabetic, 10. Informal settlement, 11. HIV+

(2) Referred from: 1. Private, 2. Self, 3. CBTBC, 4. Public, 5. TIMS Centre, 6. Police Holding Cells, 7. NCS

3) Indicate the result and date. Pre-treatment results codes: no MTB / MTB Rif R / MTB Rif S / Insuf / MTB rif I / Error / DM pos / DM neg / Other test done

(4) Patient category: (N) New, (R) Relapse, (TAF) Treatment after failure, (TALFU) Treatment after lost to follow-up, (ULO) Unknown last outcome, (UTH) Unknown treatment history

(5) Bacterilogical Classification: (B+ve) Bacteriologically positive, (B-ve) Bacteriologically negative, (SNT) Sputum not tested, (SND) Other specimen not te

(6) Treatment regimen: (SF) Standard 1st line regimen, (MF) Modified 1st line regimen (

(7) HIV status: (1)Known HIV status, (2) HIV test done at TB diagnosis, (3) Not tested/unknown

(8) HIV Result: (1) Positive, (2) Negative, (3) Not done/unknown

Version 2018.1

.TB 06: District Tuberculosis Register …. (Cont)

Disease site (PTB / EPTB)	Date treatment started (dd/mm/yy)	Treatment regimen (4)	Name of health facility where patient is treated	Treatment monitoring (result and date (dd/mm/yy))					HIV status (7)	ART (9)	Random blood sugar level	CPT (10) (insert date of initiated)	DOT Option (11)	Diagnosed from (12)	No. of close contacts identified	No. of close contact investigated	Functional or physical disability assessment (Y/N)	Clinically significant hearing loss at end of RX (Y/N/NA)	Baseline assessment of socio-economic status (Y/N)	Eligible for social grant (Y/N)	Type of grant give (13)	Assessed for catastrophic cost (Y/N)	TB treatment outcome (14)	Comments
				2 months	3 months	5 months	7 months	Other	HIV result (8)	Date of initiation	Diabetic (Y/N)				No. of close contacts screened	No. of close contacts diagnosed with TB						Facing catastrophic cost (Y/N)	Date (dd/mm/yy)	

(9) ART: (1) Already on ART, (2) Initiated on ART, (3) Not on ART; indicate date of initiation

(10) CPT: Insert the date of initiation

(11) Indicate CB-DOT code: (1) Health facility, (2) Workplace, (3) Community Health Worker, (4) Guardian, neighbour, close relative, (5) (

(12) Diagnosed from: (1) Public, (2) Private sector, (3) Correctional facility, (4) Police holding cells, (5) Mines

(13) Type of grant given: (N) None, (SSSL) Social Security Sick Leave, (DG) Disability Grant, (CA) Children Allowance, Any other socio-economic assistance (please specify)

14) Treatment outcome: Insert one of these outcomes - Cured, Treatment completed, Treatment failed, Died on Rx, Died before Rx, LTFU before Rx, LTFU on Rx, Not evaluated, Moved to DR TB register

TB 06: Community-Based DOT Card

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Health Facility:	District:	Region:
Patient NAME:	Patient SURNAME:	Reg. No.
Date of Birth *(MM/DD/YY)*:	AGE (years):	Sex:
Phone number:	Nationality:	Referred from *(1)*:
Physical address (patient):	Physical address (next of kin):	
Name of health worker (TB nurse):	Signature of health worker (TB nurse):	
Name of Organisation:	Name of DOT Point:	
Name of Community Health Workers:	Phone number(s):	
Name and address of DOT provider:	Phone number(s):	

Regimen: *Please indicate the regimen*	Standard regimen: 2RHZE/4RHE	Modified first line:	Drug-resistant TB *(write regimen abbreviation):*
Date started *(dd/mm/yy)*			
Date ended *(dd/mm/yy)*			

MEDICINES AND DOSAGES

Adult FDC [RHZE]		R 150/450mg		Streptomycin injection	
Adult FDC [RHE]		H 100/300mg		Cycloserine 250mg	
Adult FDC [RH]		Z 500mg		Levofloxacin250mg	
Child FDC [RHZ]		E 400/100mg		Ethionamide 250 mg	
Pyridoxine 25mg		Co-trimoxazole 480mg		PAS 4g sachets	

HEALTH WORKER –MEDICINE ISSUE PERIODS

Signature	From	To	Signature	From	To	Signature	From	To

INITIAL PHASE – INDICATE DATE FOR DAILY DOT*

MONTH/YEAR	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
	*						

**Insert date & initials*

Remarks:_____
_____
_____

CONTINUATION PHASE*

MONTH/YEAR	Mon	Tues	Wed	Thurs	Fri	Sat	Sun

Treatment monitoring (insert results and date)

Timing	Smear	Culture	Date*(dd/mm/yy)*	Weight	Date *(dd/mm/yy)*
0 months (pre-treatment)					
2 months					
3 months					
5 months					
7 months					
Other					

List of close contacts and action taken (inner left side)

No	Name & Surname	Age	Contacts screened *(Yes/No)*	Symptoms *(0 = symptom absent, 1 = symptom present)*					Contact diagnosed with active TB *(Yes/No)*	Contacts started on TB treatment *(Yes/No)*	TPT initiation *(Yes/No)*
				C	WL	NS	F	LN			

TB Treatment outcome: _____ Date*(dd/mm/yy)*: _____

Serial number: 9-0/0032A

TB 07: Tuberculosis Patient Transfer Form

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Name of Transferring Health Facility				**District**			
Phone No.				**Fax No.**			
Name of Receiving Health Facility				**District**			
Phone No.				**Fax No**			
Patient Name and Surname				**Registration No**			
Date of Birth *(dd/mm/yy)*		**Age** *(years)*		**Sex**			
Date treatment started *(dd/mm/yy)*				**Expected date of completion**			
Diagnostic category *(tick)*	**PTB** / **EPTB**	**New**	**Treatment after failure**	**Lost to follow-up**	**Relapse**	**Unknown last outcome**	**Unknown treatment history**

Regimen:	**Initial phase** *(Tick)*	**Continuation phase** *(Tick)*
Standard : 2RHZE/4RHE		
Modified: *(Specify)*_____		

	Results (write the relevant available results)				
Timing	Smear	Culture	Date of result *(dd/mm/yy)*	Weight	Date of weight *(dd/mm/yy)*
0 months					
2 months					
3 months					
5 months					
7 months					
Other					

MEDICINES AND NUMBER OF TABLETS

Medicine & Dosage (Initial Phase)	Adult [RHZE] - FDC		R 150mg		R 450mg		H 300 mg		E 400mg		S inj. mg		…….	
	Child [RHZ] - FDC		Z 400mg		Pyridoxine 25mg		H 100mg		E 100mg		Cotrimoxazole. 480mg		……	

MEDICINES AND DOSAGE (Continuation Phase)	ADULT FDC-[RHE]-		R 450mg		H 300mg		Pyridoxine 25mg		E 400mg	
	CHILD FDC-[RHE]		R 150mg		H 100mg		Cotrimoxazole 480mg		E 100mg	

Health Worker Name/Title	**Designation**
Signature	**Date Transferred**

NOTE: PLEASE CUT-OFF HERE AND SEND SLIP BACK TO TRANSFERRING HEALTH FACILITY AFTER YOU HAVE RECORDED PATIENT'S TREATMENT OUTCOME

Name of Receiving Health Facility	**District**
Phone No.	**Fax. No.**
Patient Name and Surname	**Registration No**
Age *(years)*	**Sex**

Your patient was received here on (date): ___/___/___TB treatment outcome: _____ Date of TB Outcome *(dd/mm/yy)* **___/___/___**

Name of health worker: _____ Designation: _____ Signature: _____

Serial number: 9-0/0032A

TB 08: Drug-resistant Tuberculosis Patient Booklet

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

DR-TB Treatment Unit:	**District:**	**Date of registration** *(dd/mm/yy)*:	
Name:	**Surname:**	**Age** *(years)*:	**Sex:**
Date of Birth *(dd/mm/yy)*:	**Occupation: Previous** **Current:**	**Nationality:**	**DR-TB registration number:**
Phone number:	**Risk category**[12]**:**	**Physical address:**	
Next of kin phone number:	**DOT option**[13]**:**	**Next of kin physical address:**	

DISEASE CLASSIFICATION AND PREVIOUS TREATMENT HISTORY

New *(please tick and indicate number of times patient was previously treated for TB)*	**PTB**		**EPTB**		**Both PTB and EPTB**	
Previously treated with 1st line TB medicines more than 4 weeks	**PTB**		**EPTB**		**Both PTB and EPTB**	
Previously treated with second-line medicines more than 4 weeks	**PTB**		**EPTB**		**Both PTB and EPTB**	

PRE-TREATMENT RESULTS

Test	Diagnostic specimen *(tick)*		Result *(tick all applicable)*										Date
	Sputum	Other *(Specify)*											
Xpert *(mandatory)*			No MTB	MTB/Rif Sen.	MTB /Rif Res.		MTB/ Rif indeterminate		Xpert error results		Xpert not done		
1st line LPA			No MTB	MTB detected	Rifampicin Sens ☐ . Res ☐				Isoniazid Sens ☐ . Res ☐				
2nd line LPA			No MTB	MTB detected	Fluoroquinolone Sens.☐ Res ☐				Inject Sens ☐ . Res.☐				
Culture			NG6W	MTB	MOTT		Contaminated		Other				
DST *Medicine*			Rifampicin		Isoniazid		Ethambutol		Streptomycin		Kanamycin		Levofloxacin		
Result (tick one)			Sens	Res	Sens	Res	Sens	Res	Sens	Res	Sens	Res	Sens	Res	
Histology *(if performed)*													

HIV STATUS AND ANTI-RETROVIRAL THERAPY

HIV status: ☐ Known HIV status ☐ HIV test done at TB diagnosis ☐ Not tested	**Result:** ☐ Positive ☐ Negative ☐ Not done		Date tested:
ART: ☐ Already on ART ☐ Initiated on ART ☐ Not on ART	HIV Unique No: _____- _____ - _____		Date initiated:
ART regimen- Before TB treatment: After initiating TB treatment:	**CD4 count:** Latest CD4 count: Date:	**Partner HIV Status** **Known:** ☐ Yes ☐ No	**Partner tested:** ☐ Yes ☐ No
Patient Received IPT before: ☐ Yes ☐ No	If IPT received , most recent year received:		
CPT: ☐ Yes ☐ No	Diabetic: ☐ Yes ☐ No	Tested now: *(write result)*	Date tested:

[12] **Risk Category-** 1=Congregate settings, 2= HCWs, 3= Children, 4=Nomadic /Seminomadic population, 5= Miner 6= Ex-miner, 7= Family member of miner 8= Family member of ex-miner 9= Diabetic, 10=Informal settlements, 11=HIV+

[13] **DOT Option**- 1 =Health facility, 2 =Workplace, 3= Community Health Worker, 4= Guardian, neighbour, close relative, 5= Other

IF PREVIOUSLY TREATED FOR TB, HISTORY OF MEDICINE USE:

Medicine	Total months used previously		Total months used previously
Rifampicin (R)		Ethionamide (Eto)	
Isoniazid (H)		Cycloserine (Cs)	
Pyrazinamide (Z)		Clofazimine (Cfz)	
Ethambutol (E)		Linezolid (Lzd)	
Streptomycin (S)		PAS	
Amikacin/Kanamycin		Meropenem / Imipenem	
Capreomycin (Cm)		Amoxycillin//clavulanate	
Ciprofloxacin (Cfx)		Bedaquiline (Bdq)	
Levofloxacin (Lfx)		Delamanid (Dlm)	
Moxifloxacin (Mfx)			

MEDICAL HISTORY

……

……

……

……

Other complicating conditions: ☐ Diabetes ☐ Renal insufficiency ☐ Hepatitis ☐ Drug or alcohol abuse ☐ Psychiatric disorders ☐ Depression ☐ Pregnancy ☐ Other, specify……..

……

……

Other medicines that the patient is currently taking (*including contraceptives*):

……

……

Physical examination*: (General physical condition, blood pressure, BMI, full physical examination, liver function, kidney function)*

……

……

……

……

X-ray findings:

……

……

……

Serial number: 9-0/0032A

SOCIOECONOMIC ASSESSMENT

Assed by social worker*:* ☐ Yes ☐ No

Family support available: ☐ Yes ☐ No

(describe)……

……

Work Status: ☐ Paid work ☐ Self-employed ☐ Non-paid work ☐ Student/ Scholar ☐ Retired ☐ Unemployed ☐ Other

Indicate the work address and contact person: ……..

Risk Factors: ☐ Alcohol abuse ☐ S*moking* ☐ Unemployed ☐ Informal settlement ☐ Nomadic

(describe)…..……

Linked to Socioeconomic Support: ☐ Yes ☐ No

(specify if yes; if no why not)…..……

Assessed for catastrophic costs Yes | No	Date assessed	Facing catastrophic cost *(total cost of TB treatment and out of pocket payment is more than 20% of annual household income)* Yes | No

DISABILITY AND REHABILITATION ASSESSMENT

Initial interview date			**End of treatment interview date**				
Name of Interviewer (*initial phase*)			**Name of Interviewer (*end of treatment*)**				
Do you have difficulties doing the following tasks:		None		Need Some Assistance		Cannot do	
		Initial phase	End of treatment	Initial phase	End of treatment	Initial phase	End of treatment
1	Standing/ Walking for long periods such as 30 minutes?						
2	Concentrating on doing something for 10 minutes?						
3	Washing your whole body?						
4	Getting dressed?						
5	Going to the toilet?						
6	Your day-to-day work/school?						
Remarks:							
Referral: *(for any ticks in the grey area please refer to rehabilitation professional)*							

LIST OF CONTACTS AND ACTIONS TAKEN:

No.	**Name & Surname**	**Age**	**Contacts screened** *(Yes/No)*	**Symptoms** *(0 = symptom absent, 1 = symptom present)*					**Laboratory investigation** *(Yes/No)*	**Contact diagnosed with active TB** *(Yes/No)*	**Contacts started on TB treatment** *(Yes/No)*	**HIV status:** *(Known /Unknown)*	**TPT initiation** *(Yes/No)*
				C	WL	NS	F	LN					
1													
2													
3													
4													
5													
6													
7													
8													
9													

Symptoms- C=cough, WL= weight loss, NS= night sweats, F= fever, LN= lymph nodes enlargement*(dd/mm/yy)*

Serial number: 9-0/0032A

CONSENT TO TREATMENT FOR DRUG-RESISTANT TUBERCULOSIS

I, _____, ID No_____, hereby consent to being admitted, investigated and treated for drug-resistant tuberculosis. I have been informed that I have drug-resistant TB, which as I have clearly understood, can spread to others and requires close monitoring to determine if the treatment that I am put on is working.

I have been told that **I will receive daily injections for several months** and that the treatment may continue for up to two years or more. The actual duration of injections and my hospital stay will depend on when laboratory test results confirm that I am no longer able to spread TB to others.

I have been properly counselled that I may suffer side effects from this treatment, such as hearing loss and stomach upset. However, I have chosen to continue this treatment on my own free will because there are no other alternative medicines for my disease.

I will be admitted in hospital to prevent spreading tuberculosis to others and to make sure that I take the medicines every day under direct observation by a health-care worker. I may be transferred from one hospital to another which is better suited to manage my condition, as decided by the medical team. I fully consent to being discharged only after the medical team has confirmed and is satisfied that I am no longer able to spread TB to others.

To prevent the spread of TB to others I may be told to cover my mouth and nose with a surgical/hospital mask and I hereby undertake to do so immediately upon being requested to do so. I will not intentionally or negligently endanger the life of members of my family or public who do not have TB by violating any of the advice given to me to protect others during my treatment and will take all reasonable steps to avoid such an endangerment.

During the course of my admission, I will not leave the hospital without the written and signed approval of the nurse in charge of the ward. I understand the gravity and seriousness of having TB and I have chosen to stay in hospital out of my own free will in order to receive treatment; therefore I shall abide by all of the terms and conditions set out in this consent form and generally by the rules and regulations of the hospital as outlined to me by the hospital authorities.

I further understand that, should I attempt to leave the hospital without consent during my treatment, physical force might be needed in order to restrain me from doing so, and that such restraint may be necessary in order to ensure my treatment period is completed and I agree to such.

I understand that to protect the effectiveness of the medicine the medical team will stop my medicine if:

- I interrupt the treatment myself, or
- there is evidence that the medicine will not work, or
- I suffer serious side effects, or
- I breach the conditions of treatment.

Furthermore, the hospital management reserves the right to ask me to leave the hospital if I disrupt smooth delivery of service at the hospital.

I have read the aforementioned and understand such and sign out of my own free will and without duress.

SIGNED…….DATE…….

WITNESS 1 (HCW)…….. WITNESS 2 (Relative/Guardian)……

REGIMEN ELIGIBILITY CHECKLIST:

For all TB patients with resistance to rifampicin, by Xpert MTB/RIF or conventional DST *(please tick in box)*			
Check	**Ask**	Yes	No
A	A1- Has the patient been previously treated for DR-TB for >1 month?		
	A2- Does this patient have extra-pulmonary TB		
	A3- Is there any reason to suspect that the patient has or will develop intolerance to any of the medicines in the STR		
	A4- Does the patient have severe lung damage (on the CXR), such as multiple bilateral cavities, extensive parenchymal damage, lung collapse?		
	A5- Is the patient pregnant?		
	A6- TB? Does the patient have a close contact who: a. Had XDR TB? b. Had resistance to fluoroquinolone or second-line injectable? c. Failed or is failing treatment for DR-TB? d. Died while on treatment for DR-TB?		
	If there is a 'YES' to any of the 6 questions, this patient is eligible for the individualised regimen, go to C below If 'NO' to all the above 6 questions, this patient is eligible for the STR, go to B below		
B	Trace results for second-line LPA, and conventional second line DST		
	B1- Is there resistance to a second-line injectable?		
	B2- Is there resistance to a fluoroquinolone?		
	If there is a YES to any of these 2 questions, this patient requires individualised regimen, go to D below. If the responses to both questions are 'No', or results unavailable, start the *Short treatment regimen (STR) for DR-TB.*		
C	Trace results for second-line LPA, and conventional second line DST		
	C1- Is there resistance to either a second-line injectable or FQ or both?		
	C2- Is there any YES on the answer to Question A6 (above)?		
	C3- Is there suspected intolerance to a second-line injectable or FQ?		
	If there is a YES to any of these 3 questions, go to D below If the response to all 3 questions is 'No', consult local DR-TB committee and start *Individualised DR-TB treatment regimen for uncomplicated patients.*		
D	Consult CCRC (national level) and start *individualised DR-TB treatment regimen for complicated patients.*		

TREATMENT:

Date treatment started	Date started *(initial phase):*		Date started *(continuation phase):*	
	Initial phase	**Dose/day**	**Continuation phase**	**Dose/day**
Short treatment regimen (Only for eligible patients)	Kanamycin		Moxifloxacin	
	Capreomycin		Clofazimine	
	Moxifloxacin		Pyrazinamide	
	Ethionamide		Ethambutol	
	Clofazimine		Ethionamide	
	Pyrazinamide			
	Ethambutol			
	Isoniazid			
	Pyridoxine			
Individualised regimen (based on DST result, treatment history and contact history)	Bedaquiline		Bedaquiline	
	Delamanid		Delamanid	
	Levoxifloxacin		Levoxifloxacin	
	Moxifloxacin		Moxifloxacin	
	Clofazimine		Clofazimine	
	Linezolid		Linezolid	
	Cycloserine		Cycloserine	
	Ethionamide		Ethionamide	
	Rifampicin		Rifampicin	
	Isoniazid		Isoniazid	
	Pyrazinamide		Pyrazinamide	
	Ethambutol		Ethambutol	
	PAS		PAS	
	Imipenem/Cilastatin		Imipenem/Cilastatin	
	Meropenem		Meropenem	
	Amoxycillin/clavulanate		Amoxycillin/clavulanate	
	Thiacetazone		Thiacetazone	
	Amikacin			
	Kanamycin			
	Capreomycin			
	Streptomycin			
Additional treatment	Cotrimoxazole		Cotrimoxazole	
	Pyridoxine		Pyridoxine	
Anti-Retroviral Treatment				
Other medicines				

NOTES:

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Serial number: 9-0/0032A

INITIAL PHASE OF TUBERCULOSIS CHEMOTHERAPY

Month/	*Sign with initials for date of DOT.*																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

CONTINUATION PHASE OF TUBERCULOSIS CHEMOTHERAPY

Month/	*Sign with initials for date of DOT or date medicines are collected. Draw a horizontal line for dates that TB medicines are taken as SAT at home*																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Treatment monitoring (intensive phase)

Month in the intensive phase	Baseline	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8
Enter Month/Year									
Body weight (kg)									
Sputum smear Neg/+/++/+++									
Sputum culture Neg/MTB/MOTT/Cont/FTG									
U&E – S. creatinine									
U&E – Creatinine clearance									
U&E – S. potassium									
LFT – ALT									
LFT – T. bilirubin									
Serum glucose									
TSH									
FBC - Hb									
Audiogram - Left hearing threshold at 8000Hz									
Audiogram - Right hearing threshold at 8000Hz									
ECG – QT interval									
Pregnancy test									
CXR (sign if performed)									

Treatment monitoring (continuation phase)

Month in the intensive phase	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Enter Month/Year												
Body weight (kg)												
Sputum smear *Neg/+/++/+++*												
Sputum culture *Neg/MTB/MOTT/Cont/FTG*												
U&E – S. creatinine												
U&E – Creatinine clearance												
U&E – S. potassium												
LFT – ALT												
LFT – T. bilirubin												
Serum glucose												
TSH												
FBC - Hb												
Audiogram - Left hearing threshold at 8000Hz												
Audiogram - Right hearing threshold at 8000Hz												
ECG – QT interval												
Pregnancy test												
CXR (sign if performed)												

ADVERSE REACTION MONITORING

INTENSIVE PHASE																										
Adverse reaction (indicate grading*)	Week																								Management	Outcome
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Abdominal pain																										
Constipation																										
Decreased hearing																										
Depression																										
Diarrhoea																										
Dizziness																										
Fatigue																										
Fever																										
Headache																										
Joint pain																										
Nausea																										
Peripheral neuropathy																										
Psychosis																										
Rash																										
Skin discolouration																										
Suicidal thoughts																										
Tinnitus																										
Tremors																										
Vision changes																										
Vomiting																										
Other (list)																										
* Grading: 0 = adverse event absent; 1 = mild; requiring minimal intervention; 2 = moderate; interfering with function and requiring palliative intervention 3 = severe; requiring change in treatment; 4 = life-threatening																										

ADVERSE REACTION MONITORING

Continuation phase																							
Adverse reaction (indicate grading*)	Month **																				Management	Outcome	
Abdominal pain																							
Constipation																							
Decreased hearing																							
Depression																							
Diarrhoea																							
Dizziness																							
Fatigue																							
Fever																							
Headache																							
Joint pain																							
Nausea																							
Peripheral neuropathy																							
Psychosis																							
Rash																							
Skin discolouration																							
Suicidal thoughts																							
Tinnitus																							
Tremors																							
Vision changes																							
Vomiting																							
Other (list)																							

* Grading: 0 = adverse event absent; 1 = mild; requiring minimal intervention; 2 = moderate; interfering with function and requiring palliative intervention
3 = severe; requiring change in treatment; 4 = life-threatening
** Indicate in the first row the month of treatment that continuation phase started

AUDIOLOGICAL MONITORING

Hearing Screening: Baseline

Name:_____

Date of Test:_____

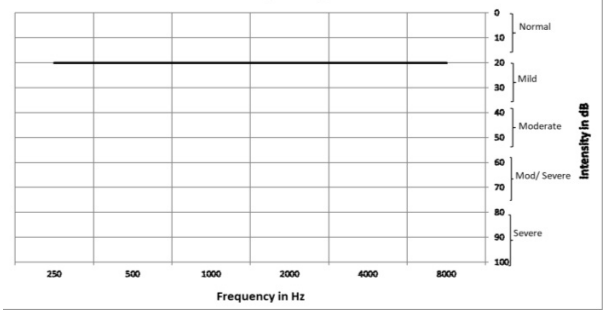
Tester:_____

Otoscope:

Obstruction:		**Discharge:**	
L:	R:	L:	R:
Inflammation:		**Other:**	
L:	R:		

Comments:_____

Screening Audiogram



Remarks:_____

_____

Hearing Screening: Month 1

Name:_____

Date of Test:_____

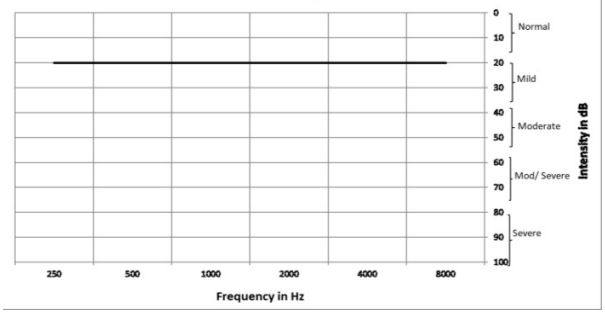
Tester:_____

Otoscope:

Obstruction:		**Discharge:**	
L:	R:	L:	R:
Inflammation:		**Other:**	
L:	R:		

Comments:_____

Screening Audiogram



Remarks:_____

_____

Hearing Screening: Month 2

Name:_____

Date of Test:_____

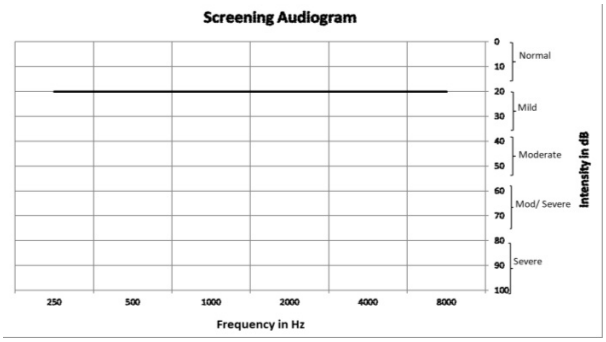
Tester:_____

Otoscope:

Obstruction:		**Discharge:**	
L:	R:	L:	R:
Inflammation:		**Other:**	
L:	R:		

Comments:_____

Screening Audiogram



Remarks:_____

Hearing Screening: Month 3

Name:_____

Date of Test:_____

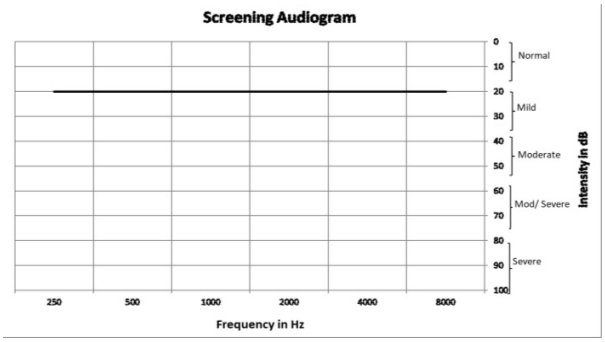
Tester:_____

Otoscope:

Obstruction:		**Discharge:**	
L:	R:	L:	R:
Inflammation:		**Other:**	
L:	R:		

Comments:_____

Screening Audiogram



Remarks:_____

Serial number: 9-0/0032A

TB 9: Drug-resistant Tuberculosis Register

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Unique district DR-TB Register.no	Date of Reg. *(indicate *TI* if transferred in)* (dd/mm/yyyy)	Names & Surname	Sex	Date of Birth (dd/mm/yyyy)	Age *(in years)*	Nationality	Occupation *(current or previous)*	Physical Address *(patient)*	Phone Number *(patient)*	DiseaseSite (P/EP)	Category *(2)*	Classification *(3)*	TB/HIV information			Random blood sugar level	Xpert MTB/Rif		2nd line LPA result R=resistant, S= susceptible, ND =Not Done	
							Primary Risk Category *(1)*	Physical Address *(next of kin)*	Phone Number *(next of kin)*				HIV Status *(4)*	ART regimen *(6)*	CPT *(Y/N)*	Diabetic *(Y/N)*	Date sample taken	Date of result	Inj	Fqn
													Result & Date *(5)*	Date initiated	Date initiated			Result *(7)*		

TB 09: Drug-resistant Tuberculosis Register ….. (Cont)

Result of Drug Susceptibility Testing (DST) *R=resistant, S=susceptible, C=contaminated, ND=Not Done*									Reasons for registration *(type of DR TB) (8)*	Date of diagnosis *(dd/mm/yyyy)*	Diagnosed from *(9)*	Date treatment started *(dd/mm/yyyy)*	DR-TB treatment regimen (STR / ITR) *(10)* If ITR, specify	Smear(S) and Culture(c) results during treatment (insert worst result for that month)																							
R	H	E	S	Km	Lfx	Eto	Other	Other						Month 0 *(dd/mm/yyyy)*		Month 1 *(dd/mm/yyyy)*		Month 2 *(dd/mm/yyyy)*		Month 3 *(dd/mm/yyyy)*		Month 4 *(dd/mm/yyyy)*		Month 5 *(dd/mm/yyyy)*		Month 6 *(dd/mm/yyyy)*		Month 7 *(dd/mm/yyyy)*		Month 8 *(dd/mm/yyyy)*		Month 9 *(dd/mm/yyyy)*		Month 10 *(dd/mm/yyyy)*		Month 12 *(dd/mm/yyyy)*		Month 14 *(dd/mm/yyyy)*		Month 16 *(dd/mm/yyyy)*		Month 18 *(dd/mm/yyyy)*		Month 20 *(dd/mm/yyyy)*		Month 22 *(dd/mm/yyyy)*	
														S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C
														/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /	
														/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /	
														/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /	
														/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /	
														/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /		/ /	

Reasons for registration

MDR= confirmed MDR-TB
XDR= confirmed XDR-TB
PDR= confirmed polydrug resistant TB
Rif mono= Rifampicin monoresistant TB
Suspected = Commenced 2nd line Rx with no DST result

Medicine abbreviations

First-line medicines

H= Isoniazid
R= Rifampicin
E=Ethambutol
Z=Pyrazinamide
S=Streptomycin

Second-line medicines

Km= Amikacin
Eto = Ethionamide
Lfx = Levofloxacin
Cs = Cycloserine
PAS = Para-amino salicylate
Cm = Capreomycin
Cfz = Clofazimine
Amx+clv = Amoxycillin with clavulanate
Clr = Clarithromycin
Lzd = Linezolid

TB 09: Drug-Resistant Tuberculosis Patient Booklet ….. (Cont)

Date of Baseline socio-economic assessment	Assessed for catastrophic cost (Y/N)	Significant hearing loss *(Y/N)*	DOT Options *(12)*	No. of close contacts identified	No. of close contacts with susceptible TB	Rx Outcome and Date *(13)*	Comments
Support given *(11)*	Experiensing catastrophic cost (Y/N)	Date of baseline disability assessmen		No. of close contacts screened	No. of close contacts with DR-TB	Date	
						/ /	
						/ /	
						/ /	
						/ /	
						/ /	

Notation method for recording smears (for non-centrifuged specimens)

No. AFB	0
1-9 AFB per 100 HPF	Scanty (and report number of AFB)
10-99 AFB per 100 HPF	+
1-10 AFB per HPF	++
>10 AFB per HPF	+++

Serial number: 9-0/0032A

TB 10: Drug-Resistant Tuberculosis Patient Transfer/Referral Form

National Tuberculosis and Leprosy Programme

Health Facility referred/transferred from:		District:		
Phone No.:		Fax No:		
Health Facility referred/transferred to:		District:		
Phone No.:		Fax No:		
Patient name:		Surname:		
DR-TB Registration No:	Date of birth:	Age *(years):*	Sex:	Weight: kg

Current treatment option: ☐ Inpatient ☐ Outpatient

Diagnostic category (tick): ☐ MDR ☐ Rif Poly ☐ Other PDR ☐ XDR ☐ Rif mono ☐ Rif Xpert ☐ Clinically MDR ☐ Other

New physical address	Phone number
Next of kin name	Next of kin phone number

REASON FOR TRANSFER/REFERRAL:

……

……

Date TB treatment started*(dd/mm/yy)*: _____/_____/_____ Expected completion date of TB treatment*(dd/mm/yy)*: _____/_____/____

DRUG SUSCEPTIBILITY TESTING (DST) RESULTS (Insert R-resistant or S-sensitive)

	DATE (collected)	H	R	E	S	Km	Ofx	Eto	Other(specify)
Initial	/ /								
Most Recent	/ /								

Indicate regimen type: ☐ Individualised regimen ☐ Standardised regimen *(please tick)*

REGIMENS AND REGIMEN CHANGES *(tick)*

Date: *(started/altered)*	H	R	Z	E	Km	Lfx	Eto	Cs	PAS	Bdq	Dlm	OTHER *(specify)*		
/ /														
/ /														
/ /														
/ /														
/ /														
Current regimen _____ **Date:** / /														

COMMENT ON ADHERENCE: ☐ Good ☐ Poor / Needs supervision **WAS ON DOT:** ☐ Yes ☐ No

TREAMENT MONITOIRING RESULTS *(insert worst)*

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	Other Latest
Date																							
DM result																							
Culture result																							

Next sputum collection due on: _____/_____/____ TB Treatment supplied for: _____days Last dose to be taken on: ____/____/____

Other treatment (Y/N): ☐ ART *(specify)* _____ ☐ CTX ☐ Pyridoxine ☐ Multi-Vit ☐ Other *(specify)* _____

Health Worker Name: _____ Designation: _____ Signature: _____

Date transferred / referred*(dd/mm/yy)*: _____/_____/____

PLEASE TEAR-OFF HERE AND SEND SLIP BACK TO TRANSFERRING HEALTH FACILITY AFTER YOU HAVE RECORDED PATIENT'S TREATMENT OUTCOME

PATIENT FINAL TREATMENT OUTCOME UPDATE SLIP

Name of Receiving Health Facility:	Receiving District:
Phone No.:	Fax No:
Patient name:	Surname:
Reg. Number:	
Name of referring/transferring facility	Your patient was received here on (date):_____/_____/_____

TB TREATMENT OUTCOME: _____ Date*(dd/mm/yy)* _____/_____/_____

Comments:……
……
……
……

Health Worker Name: _____ Designation: _____

Signature: _____ Date*(dd/mm/yy)*: _____/_____/____

……
PLEASE TEAR-OFF HERE AND SEND SLIP BACK TO TRANSFERRING HEALTH FACILITY AS SOON AS YOU RECEIVE THE PATIENT.

DR-TB PATIENT DESTINATION UPDATE SLIP

Name of Receiving Health Facility:_____District:_____

Phone number: _____ Fax _____

Patient Name: _____ Surname:_____

Reg. Number: _____

Name of transferring (HCW) _____Name of transferring facility:_____

Your patient was received here on (date):_____/_____/_____

Comments:……
……

Health Workers Name: _____ Designation:_____

Signature: …… Date*(dd/mm/yy)*: …….

Serial number: 9-0/0032A

TB 11: Tuberculosis Contact Investigation Slip

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

TB CONTACT SLIP

Index Patient Registration No:	
Date:	Health facility:
Name of Health Worker:	

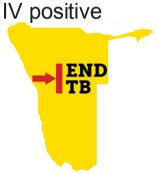
Dear Sir/Madam,
This is to inform you that a close relative, friend, or colleague of yours was recently diagnosed with tuberculosis (TB) disease.

1. Because of the nature of TB disease, it is possible that you might have been infected with TB germs. If you are infected, you may experience the following problems now or some time later:
   - Cough
   - Weight loss
   - Night sweats
   - Fever
   - Swellings in the neck, armpits or groin (Lymph node enlargement)

   If you have any of the above symptoms now, we strongly advise you to visit any health facility and present this slip for medical attention.

2. If there is any close contact living with HIV and children under the age of five years, they should also visit their nearest health facility for assessment and provision of TB preventive medicine if they do not have signs and symptoms of TB.

3. If you are not ill now, you may still become ill with TB after some months or years. To stop this from happening, please visit your nearest health facility for:
   - More information and advice on how to protect yourself from TB
   - Examination by a health care worker
   - Provision of TB treatment or preventive medicine if required
   - HIV counselling and testing
   - Specific treatment in case you are HIV positive



Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

TB CONTACT TEAR-OFF SLIP

Index Patient Registration No:	
Name of contact being assessed:	
Address: Telephone number:	
Date:	Health facility:
Name of Health Worker:	

Yes	Symptoms to ask about	No
	Cough for two weeks or more?	
	Weight loss?	
	Night sweats?	
	Fever?	
	Swellings in the neck, armpits or groin (Lymph node enlargement)?	
	Under the age of 5 years?	
	HIV positive?	
	Other Immunosuppressive conditions (Diabetes/cancer/on corticosteroids)?	

If yes to any of the above; visit to nearest health facility for further assessment.

Serial number: 9-0/0032A

TB 12: Client TB Preventive Therapy (TPT) Card

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Client TPT Card

Client Registration No.		Name of health facility	
District			
Name		Surname	
DOT Supporter name (if any)			
Physical address			
Age *(years)*	D.O.B: *(dd/mm/yy)*	Sex	Nationality:
Occupation		Screened for TB (Y/N)	
HIV Status(1)			

Reason for TPT *(Tick the most appropriate one)*	HIV+	TB Contact < 5 years old	Diabetic	Other Immuno-suppressive conditions *(cancer/on corticosteroids, other)*

Medicine collections

(Record date when medicines were collected)

1	2	3
4	5	6
7	8	9
10	11	12

MEDICINES AND DOSAGES

weight at start of treatment (kgs):	

Medicine	# of tablets
Isoniazid 100mg	
Isoniazid 300mg	
Pyridoxine 25mg	
Other forms of TPT *(To be considered by an expert consultant)*	
Isoniazid and rifapentine	
Isoniazid and rifampicin	
Rifampicin alone	

Date started *(dd/mm/yy)*: ____/_____/___Date ended *(dd/mm/yy)*: _____/_____/_____

Outcome of prophylaxis (TPT) (*Please write date (dd/mm/yy)*)				
Completed	Stopped	Lost-to-follow up	Died	Transfer out

Previous TPT history: *Ever on TPT (Y/N (please verify with health passport or register)*

Most recent TPT outcome *(if yes):*	Year of most recent TPT outcome:

Previous TB treatment history: Ever treated for TB (Y/N)

(Please verify with health passport or register)

Most recent TB treatment outcome *(if yes):*	Year of most recent TB treatment outcome

Serial number: 9-0/0032A

TB 13: TB Preventive Therapy (TPT) Register

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Reg.no	Date of Reg. (dd/mm/yy)	Name(s) / Surname	Date of birth (dd/mm/yy)	Age (in years)	Sex	Occupation (current) / Occupation (previous)	Risk category (list all applcable) (1)	Nationality	Physical Address (patient) / Phone number (patient)	Physical Address (next of kin) / Phone number (next of kin)	DOT supporter (name) / DOT supporter (number)	Health Facility	Date started on TPT (dd/mm/yy) / TPT Regimen (2)	Reason forTPT client (3)	HIV Status (4)	Date and number of doses collected: 1	2	3	4	5	6	7	8	9	10	11	12	History of TPT (Y/N) / TPT Outcome	Previously treated for TB (Y/N) / TB Outcome	Outcome of TPT (5) / Date (dd/mm/yy)	Comments

(1) Risk category - 1. Congregate settings, 2. HCWs, 3. Children, 4. Nomadic /Seminomadic population, 5. Miner 6. Ex-miner, 7. Family member of miner 8. Family member of ex-n
(3) Reason for IPT : 1= HIV+ 2= under 5 yrs contacts 3= Diabetic 4= Other(
(5) TPT Outcome: Completed, Died,Treatment stopped, Developed TB, Lost-to-follow up, Transferred out
(3) TPT regimen: 1= Izoniazid 100mg 2=Izoniazid 300mg 3= pyradoxine 4= Izoniazid + rifampicin 5=Izoniazid + rifampetine 6= Rifimpacin alone
4) HIV status: 1=positive,2=Negative, 3= Unknown/not tested

Serial number: 9-0/0032A

TB 14: Tuberculosis and Leprosy Quarterly Report Form

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

District:							**Region:**						**Date:**						
Name of DTLC:							**Signature:**						**Cases registered in yea**r *(enter year &Tick quarter below)*						
1st Quarter (1 January- 31 March)			2nd Quarter (1 April-30 June)				3rd Quarter (1 July -30 September)						4th Quarter (1 October- 31 December						

PART A: QUARTERLY REPORT ON NEW AND PREVIOUSLY TREATED TB CASES, CONTACT INVESTIGATION AND HEALTH WORKERS TRAINED

		Bacteriologically positive pulmonary			Clinically diagnosed pulmonary						Clinically Extra-pulmonary TB				TOTAL		Total
					Bacteriologically negative		Sputum not tested adult		Sputum/ gastric aspirate not tested child		Bacteriologically positive		Bacteriologically negative				
		M		F	M	F	M	F	M	F	M	F	M	F	M	F	
New																	
Previously Treated	Relapse																
	TALFU																
	TAF																
	Unknown last outcome																
Treatment history unknown																	
Total																	
Number refferred from Private facilities *(among all forms of TB notified)*																	
Number foreign nationals *(among all forms of TB patients snotified)*																	

Age-Sex distribution of new and relapse TB cases										
Age in years	0-4	5-9	10-15	16-24	25-34	35-44	45-54	55-64	65+	TOTALS
M										
F										
TOTALS										

Social Protection and Rehabilitation	
Number of TB patients with documented socio economic assessment	
Patients referred for social support/grants	
Patients assessed for functional or physical disability	
Proportion of patients on TB treatment facing catastrophic costs in quarter *(numerator and denominator)*	

PART B: TB/HIV and Diabetic Indicators (All new and relapse TB patients registered during the quarter)

	M	F		M	F		M	F
N+R TB patients with known HIV status			HIV positive N+R TB patients on ART			Number of N+R TB patients tested for diabetes		
N+R TB patients who are HIV positive			HIV positive N+R TB patients on CPT			Number of N+R TB patients who are diabetic		

Part C: ANTI-TB MEDICINES STOCK STATUS (in quarter)	# of Facilities in district	# of Facilities with stockouts		Average duration of stockout (days)				
			R	H	E	Z	S	Other
Stock out of First-line TB medicines								

Part D: Other programmatic indicators (during reporting quarter)

Number N+R patients with documented contacts				Miners & inmates		Indicator	GxP +ve	GxP -ve	No GxP results	Total
Indicator	<5 yrs contacts	5+ yrs Contacts	Total contacts	Miners,ex-miners and their families	Inmates					
Number identified						Presumptive TB undergoing bacteriological examination *(lab/sputum register)*				
Number screened for TB						Number of New patients *(TB treatment register)*				
Number with lab investigation for TB						Number of Relapse patients *(TB treatment register)*				
Number diagnosed with active TB						Patients with unknown treatment history *(TB treatment register)*				
Number commenced on TPT						Number of cases with a Gene Xpert +ve result who have Rifampicin resistance				
						Number of health workers trained on TB	M		F	

TBIC indictors	Clinical	Non-clinical	TBIC Indicators	Clinical	Non-clinical
Number of HCWs screened for TB			Number of HCWs fit tested		
Number of HCWs diagnosed with TB					

PART E: TREATMENT OUTCOMES FOR TB PATIENTS REGISTERED DURING SAME QUARTER LAST YEAR

		No. notified	Cured	Treatment completed	Treatment failure	Died before Rx	Died on Rx	LTFU before Rx	Loss to follow-up on Rx	Not evaluated *(incl Transfers/not-out)*	Total number Evaluated	Moved to DR TB register
New pulmonary bacteriologiacally positive cases												
New pulmonary clinically diagnosed												
New Extra-pulmonary												
Previously treated	Relapse - pulmonary bacteriologically confirmed											
	Relapse-pulmonary clinically diagnosed											
	Relapse- extra pulmonary											
	Previously treated excluding relapse *(TALFU, TAF,Unknown last outcome)*											
Treatment History Unknown												
Total												
TB Patients (HIV+ only)												
Treatment outcomes for patients started on treatment (all forms of TB)												
Treatment outcomes for foreign nationals (among all forms of TB patient notified)												

TB 15: DR-TB Quarterly Reporting Form

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

District:		District code:	Region:	
Name of DTLC:			Signature	Date:
Cases registered in (Quarter), Year *(Tick or circle on the quarter)*	Quarter1 (1 January- 31st March)	Quarter 2 (1 April-30 June)	Quarter 3 (1 July -30 September)	Quarter 4 (1 October- 31 December)

PART A: Quarterly report on laboratory diagnosis of DR-TB

	Rif resistance detected	Rif resistance not detected	Rif resistance Indeterminate/Not available	Total
No. of Xpert MTB/RIF +ve New and Relapse TB patients in **Laboratory register or laboratory list**				
No. of Xpert MTB/RIF +ve New and Relapse TB patients in **DR-TB Treatment register**				
No. of Xpert MTB/RIF +ve patients Notified by private laboratories				
Totals				

PART B: Quarterly report on laboratory 2nd line drug susceptibility test among those with Rifampicin resistant TB (F

	Fqn (S) SLI (S)	Fqn (R) SLI (S)	Fqn (S) SLI (R)	Fqn (R) SLI (R)	No 2nd line DST results	Total
No. of patients with Rif resistance in **TB laboratory registers/lists**						
No. of patients with Rif resistance in **DR-TB treatment registers**						
Totals						

PART C: Quarterly report on registered DR-TB cases *(Cases registered in this* reporting quarter)*

	MDR-TB		XDR-TB		Rif-Xpert		Rif-mono		Rif-poly		Other PDR		Clinically diagnosed MDR-TB/Other		**Totals**
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
New															

Prev treated with 1st line medicines															
Prev treated with 2nd line medicines															
Totals															

PART D: Quarterly report on registered rifampicin resistant TB cases that began treatment

Total DR-TB Notified this quarter	
Total rifampicin-resistant TB cases *(Rif Mono, Rif Xpert, Rif-poly, MDR, XDR)* notified	
Rifampicin-resistant -TB cases that began the short treatment regimen	
Rifampicin-resistant TB cases that began individualized regimen *(containing either Bedaquiline or Delamanid or both)*	
Total notified rifampicin-resistant TB cases that began 2nd line treatment	

PART E: DR-TB/HIV Indicators *(All DR-TB patients registered during the quarter)*

	M	F		M	F		M	F
DR-TB patients with known HIV status			HIV positive DR- TB patients on ART			Number of DR- TB patients tested for diabetes		
DR-TB TB patients who are HIV positive			HIV positive DR- TB patients on CPT			Number of DR- TB patients who are diabetic		

PART F: SOCIAL SUPPORT AND REHABILITATION (DR-TB patients notified in quarter)

Number of DR-TB patients assessed for disability	
Number of DR-TB patients with significant h*earing loss*	
Number of DR-TB patients with document assessment of social-economic status	
Number of DR-TB patient receiving social support (nutritional or financial support)	

Catastrophic assessment: same quarter previous year

Number of DR-TB patients started on treatment same quarter last year	
Number of DR-TB patients on treatment assessed for catastrophic cost	
Number of DR-TB patients on treatment facing catastrophic cost	

COMMENTS *(Must include update on cases of clinically diagnosed MDR-TB and rifampicin resistant on Xpert MTB/RIF cases reported in previous quarter)*

.....
.....
.....
.....
.....

PART G: 6-month interim assessment for patients reported in the ___quarter of 20____(year*)*

	Cured	Treatment completed	Culture-positive on Rx	Culture-negative on Rx	Died	Failed	LTFU/ Treatment stopped	Transferred-Out	Total number evaluated
MDR-TB									
XDR-TB									
Rif Xpert									
Rif mono									
Rif-poly									
Other PDR-TB									
Clinically diagnosed MDR-TB/Other									
Total									

PART H: 12-month outcome assessment for patients started on <u>the short treatment regimen</u> in the ____quarter of 20__ *(year)*

	Number started on STR	Cured	Treatment completed	Died	Failed	LTFU	transfer out	Total number evaluated	Other *(rx stopped,diagnosis changed)*
TOTAL									

PART I: 12-month interim assessment for patients started on <u>individualised regimens</u> in the _____quarter of 20__ *(year)*

	(1) Cured	(2) Treatment completed	(3) Culture-positive on Rx	(4) Culture-negative on Rx	(5) Died	(6) Failed	(7) LTFU	(8) Transferred-out	(sum of 1-8) Total number evaluated	Treatment stopped (9)
MDR-TB										
XDR-TB										
Rif Xpert										
Rif mono										
Rif poly										
Other PDR-TB										
Clinically diagnosed MDR-TB/Other										
TOTAL										

PART J: 24-month (final) outcome assessment for patients reported in the _____quarter of 20___*(year)*

	(1) Cured	(2) Treatment completed	(3) Died	(4) Failed	(5) LTFU	Transfer -Out(6)	(sum of 1-6) Total number evaluated	Not evaluated (Treatment stopped *, Transferred-out , Culture-positive on Rx , Culture-negative on Rx)*
MDR-TB								
XDR-TB								
PDR-TB								
RifXpert								
Rif mono								
Rif poly								
Other PDR-TB								
Clinically diagnosed MDR-TB/Other								
TOTAL								

Part K: ANTI-TB MEDICINES STOCK STATUS (in quarter)

			Average duration of stock-outs (days)											
	# of Facilities in district	# of Facilities with stock outs	Lfx	Km	Eto	Mfx	C	Bdq	Cm	Amx+clv	Lzd	Dlm	Cfz	PAS
Stock out of 2nd -line TB medicines														

Serial number: 9-0/0032A

TB 16: Quarterly Outcome Report for TB Preventive Therapy (TPT)

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Region:	District:	
Name of DTLC:	Signature:	Date of Report:

Period of reporting & Year *(Tick the quarter, and enter the year)*	1st Quarter (1 January-31 March)	2nd Quarter (1 April – 30 June)	3rd Quarter (1 July – 30 September)	4th Quarter (1 October – 31 December)

Part A: TB Screening during the reporting period

Number of clients screened for TB	Number of clients eligible for TPT	Number of clients screened and diagnosed with active TB

Number of clients previously treated for TB	Number of clients with previous TPT history

Part B: Client Registration during the reporting period

	Under 5 years TB Contacts	Under 5 years TB Contacts who is HIV positive	HIV Positive *only*	Diabetic *only*	HIV Positive *and* Diabetic	HIV Positive *and* Other Immuno-suppressed	Other Immuno-suppressed *only*	TOTAL
Number of clients registered for TPT								
Number of clients initiated on TPT								

Part C: TPT Outcome (Same Quarter Previous Year)

	Total Number of Clients Registered	Completed		Treatment Stopped		Lost to Follow-Up		Died		Transfer Out		TOTAL EVALUATED	
		#	%	#	%	#	%	#	%	#	%	#	%
Under 5 years TB Contacts													
HIV Positive *only*													
Diabetic *only*													
Other Immuno-suppressed													
TOTAL													

TB 17: District Quarterly Report on Community-based Tuberculosis Care (CBTBC)

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Region:	**District:**	**Name of DTLC:**	**Date:**
Name of person submitting report		**Signature:**	**Year:**
Name of reporting organisation		**Source of Funding:**	

Cases registered in (Quarter) *(Tick or circle on the quarter below, and enter the year)*

Quarter 1(1 January- 31 March)	Quarter 2 (1 April-30 June)	Quarter 3 (1 July -30 September)	Quarter 4 (1 October- 31 Decen

Programmatic indicators		Number / %		Total
1. Number of new and relapse TB patients registered in the district during reporting quarter		Male	Female	
2. Number of new and relapse (N+R) TB patients registered under your organisation among new relapse TB cases registered in the district during reporting quarter				
3. Number of (N+R) TB patients registered under your organisation with a known HIV status				
4. Number of presumptive TB (N+R)cases referred to health facilities for TB examinations by CHWs				
5. Number of presumptive TB (N+R) cases referred to health facilities for TB examination by CHWs diagnosed with TB				
6. Number of TB patients on treatment in the community at the end of the reporting quarter, in the organisation				
7. Number of DR-TB patients on treatment in the community during reporting quarter				
8. Number of CHWs in the district at end of reporting quarter				
9. Number of CHWs trained during the reporting quarter	TB guideline			
	TBIC			
	TB/HIV			
	DR-TB			
10. Number of TB awareness health educations sessions events conducted				
11. Number of community members reached through health educations sessions				
12. Number of close contacts identified				
13. Number of close contacts-screened for TB				
14. Number of close contacts diagnosed with TB				
15. No. of (N+R) TB patients registered under your organisation during the same quarter the previous year				
16. Treatment success rate (cured +treatment completed) of (N+R)TB patient s during the reporting quarter				
17. Number of Lost to follow up during the reporting quarter				
18. Number of interrupters during the reporting quarter				
19. Number of interrupters traced who were put back on treatment				
20. Number of TB patients provided with food supplements				
21. Number of patients/former TB patients trained in life-skills activities				
22. Number of IEC materials distributed		posters	leaflets	booklets	other
23. Number of community income generating activities in the region				

Challenges:……
Planned activities for next quarter:……
Comments/ Additional information:……

TB 18: Namibia ACSM Documentation Format

Republic of Namibia
Ministry of Health and Social Services
National Tuberculosis and Leprosy Programme

Region:_____ **District:**_____ **DTLC (name & signature):**_____ Tick the quarter: Q1 (Jan-Mar) Q2 (Apr-June) Q3 (July-Sept) Q4 (Oct-Dec) **Year:**_____

Serial number:_____

	Report on community based activity				Report on advocacy activities				Report on I.E.C materials developed & disseminated				
No.	**Activity**	**Measurement unit**	**No. of planned activities**	**No. of activities conducted (2)**	**Activity**	**Measurement unit**	**No. of planned activities**	**No. of activities conducted (2)**	**TB materials** / **Leprosy materials**	**Please indicate No. in approriate column (3)** Developed	Reproduced	In-stock	**No. disseminated**
	Health education sessions	*No. of sessions* *No. of people attended*			World TB day	*Report produced* *No. of people attended*			TB posters				
	Community mobilization *(1)*	*No. of mobilizations done*			TB awareness week	*Report produced* *No. of people attended*			Leprosy posters				
	Home visits	*No. of home visits* *No. of people met*			World leprosy day	*Report produced* *No. of people attended*			TB leaflets				
	Workplace visits	*No. of institutions* *No. of workplace visits* *No. of people met*			Leprosy advocacy meetings	*No. of meetings* *No. of people attended*			Leprosy leaflets				
	Leprosy senzitization meetings	*No. of meetings* *No. of people attended*			Television coverage	No. of appearances /interviews No. of adverts run			TB booklets				
	Sensitization meetings with community leaders	*No. of meetings* *No. of people attended*			Radio talks	No. of appearances /interviews No. of adverts run			Leprosy booklets				
	Sensitization meetings with traditional healers	*No. of meetings* *No. of people attended*			Newspaper inserts	No. of placements /interviews No. of adverts			TB banners				
	Sensitization meetings with school counsellors and life skills teachers	*No. of meetings* *No. of people attended*			Other:_____				Leprosy banners				
	Community health meetings	*No. of meetings* *No. of people attended*			Other:_____				TB other (specify):_____				
	Community Health Committee (CHC) meetings	*Existence of TORs* *Committee established* *No. of meetings held*			Other:_____				Leprosy other (specify):_____				
	Other:_____				Other:_____				TB other (specify):_____				
	Other:_____				Other:_____				Leprosy other (specify):_____				
	Other:_____												

Activity Budget and expenditure:

Activity	**Budget**	**Expenditure**
Community based activities *(4)*		
TB IEC materials *(5)*		
Leprosy IEC materials *(5)*		
TB Awareness week		
World TB day activities		
World leprosy day		
Leprosy awareness meetings		
Advocacy activities *(6)*		
Mass media campaign (television, radio, newspaper, and other)		
Total	**0**	**0**

(1) Community mobilization includes but is not limited to the following: intercom announcements, information desk, community annoucement (eg. In church or schools), poster placement in community, etc.
(2) Please attached activity report to this quarterly report
Reproduced: indicate the quantity reproduced during the quarter
(4) This includes budget and expenditure for all community based activities
(5) This includes budget and expenditure for all IEC materials
(6) This includes budget and expenditure for all advocacy activities

Version 201

REFERENCES

- García-Basteiro, A. L., DiNardo, A., Saavedra, B., Silva, D. R., Palmero, D., Gegia, M., … Theron, G. (2018). Point of care diagnostics for tuberculosis. *Pulmonology*, *24*(2), 73–85. https://doi.org/10.1016/J.RPPNEN.2017.12.002
- Griffith, D. E., Aksamit, T., Brown-Elliott, B. A., Catanzaro, A., Daley, C., Gordin, F., … Winthrop, K. (2007). An Official ATS/IDSA Statement: Diagnosis, Treatment, and Prevention of Nontuberculous Mycobacterial Diseases. *American Journal of Respiratory and Critical Care Medicine*, *175*(4), 367–416. https://doi.org/10.1164/rccm.200604-571ST
- International Union Against TB and Lung Disease. (2016). *The union's desk guide for diagnosis and management of TB in children* (Third). Paris.
- KNCV Tuberculosis Foundation. (2016). *Generic programmatic and clinical guide for the introduction of new drugs and shorter regimen for treatment of Multi / Extensively Drug- Resistant Tuberculosis*. The Hague: Challenge TB Project.
- Mirsaeidi, M., Farshidpour, M., Ebrahimi, G., Aliberti, S., & Falkinham, J. O. (2014). Management of nontuberculous mycobacterial infection in the elderly. *European Journal of Internal Medicine*, *25*(4), 356–363. https://doi.org/10.1016/j.ejim.2014.03.008
- Reider, H. (1999). *Epidemiologic Basis of Tuberculosis Control*. Paris: International Union Against Tuberculosis and Lung Disease.
- Reider, H. (2002). *Interventions for Tuberculosis Control and Elimination*.
- Cantwell, M. F., Shehab, Z. M., Costello, A. M., Sands, L., Green, W. F., Ewing, E. P., Valway, S. E., & Onorato, I. M. (1994). Congenital Tuberculosis. New England Journal of Medicine, 330: 1051-1054.
- Crofton, J., Horne, N. & Miller, F. (1999). Clinical Tuberculosis, 2nd Edition. Paris: IUATLD. 1999
- Daley, C. L. & Griffith, C. L. (2010). Pulmonary Non-Tuberculous Mycobacterial Infections. International Journal of Tuberculosis and Lung Disease, 14(6):665–671.
- Francis J. Curry National Tuberculosis Center and California Department of Public Health. (2008). Drug-Resistant Tuberculosis: A Survival Guide for Clinicians, Second Edition.
- Griffith, D. E., Aksamit,T., Brown-Elliott,B. A., Catanzaro A., Daley,C., Gordin, F., Holland,S. M., Horsburgh,R., Huitt,G., Iademarco,M. F., Iseman,M., Olivier, K., Ruoss, S., von Reyn, C. F., Wallace, R. J. & Winthrop,K. (2007). Diagnosis, Treatment, and Prevention of Non-tuberculous Mycobacterial Diseases: An Official ATS/IDSA Statement. American Journal of Respiratory and Critical Care Medicine, 175: 367-416
- Hassan, G., Qureshi, W., & Kadri, S. M. (2006). Congenital Tuberculosis. JK Science, 8(4): 193-194.
- Hesseling, A. C., Rabie, H., Marais, B. J., Manders, M., Lips, M., Schaaf, H. S., Gie, R. P., Cotton, M. F., van Helden, P. D., Warren, R. M., & Beyers, N. (2006). Bacille Calmette-Guerin Vaccine–Induced Disease in HIV-Infected and HIV-Uninfected Children. Clinical Infectious Diseases, I42(4): 548-558.
- Internal Impact Assessment of Omaheke Health and Education Programme (OHEP): Namibia, Period covered April 1999 – September 2004
- Lettieri, C. J. (2008). Nontuberculous Mycobacteria: Update on Diagnosis and Treatment. Medscape Pulmonary Medicine. [Online], Available: http://www.medscape.org/viewarticle/568541
- Lönnroth, K., Jaramillo, E., Williams, B. G., Dye, C. & Raviglione, M. (2009). Drivers of Tuberculosis Epidemics: The Role of Risk Factors and Social Determinants. Social Science Medicine, 68(12): 2240-2246
- MoHSS. (2010). National Guidelines for Antiretroviral Therapy. Windhoek: Ministry of Health and Social Services
- MoHSS. (2010). National Tuberculosis and Leprosy Programme Annual Report: 2009-2010. Windhoek: Ministry of Health and Social Services
- MoHSS. (2010). Second Medium-Term Strategic Plan for Tuberculosis and Leprosy (2010-2015). Windhoek: Ministry of Health and Social Services.
- Partners in Health. (2002). A DOTS-Plus Handbook. Guide to the Community-Based Treatment of MDR-TB. Boston: Harvard Medical School.
- Partners in Health. (2003). The PIH Guide to the Medical Management of Multidrug-Resistant Tuberculosis. Boston: Partners in Health.

- Rieder, H. (1999). Epidemiologic Basis for Tuberculosis Control. Paris: IUATLD.
- Rieder, H. (2002). Interventions for Tuberculosis Control and Elimination, First Edition. Paris: IUATLD
- Tuberculosis Coalition for Technical Assistance. (2009). International Standards for Tuberculosis Care (ISTC), 2nd edition. The Hague: Tuberculosis Coalition for Technical Assistance.
- WHO & IUATLD. (2009). Guidance for National Tuberculosis and HIV Programmes on the Management of Tuberculosis in HIV-Infected Children: Recommendations for a Public Health Approach. World Health Organisation and the International Union Against Tuberculosis and Lung Disease.
- WHO. (1997). Tuberculosis Control. The DOTS Strategy (An Annotated Bibliography). Geneva: World Health Organisation
- WHO. (2000). Guidelines for Establishing DOTS-Plus Pilot Projects for the Management of MDR-TB. Geneva: World Health Organisation.
- Satta, G., McHugh, T. D., Mountford, J., Abubakar, I., & Lipman, M. (2014). Managing Pulmonary Nontuberculous Mycobacterial Infection. Time for a Patient-centered Approach. *Annals of the American Thoracic Society*, *11*(1), 117–121. https://doi.org/10.1513/AnnalsATS.201308-278OT
- Shah, M., Hanrahan, C., Wang, Z. Y., Dendukuri, N., Lawn, S. D., Denkinger, C. M., & Steingart, K. R. (2016). Lateral flow urine lipoarabinomannan assay for detecting active tuberculosis in HIV-positive adults. *The Cochrane Database of Systematic Reviews*, (5), CD011420. https://doi.org/10.1002/14651858.CD011420.pub2
- Smith, D., Gorsuch, T., Banks, J., Fisher, A. J., Nightingale, M., Leitch, A., … Ormerod, P. (2017). *British Thoracic Society guidelines for the management of non-tuberculous mycobacterial pulmonary disease (NTM-PD)*. *Thorax* (Vol. 72). https://doi.org/10.1136/thoraxjnl-2017-210927
- WHO. (2015). *Latent tuberculosis infection*. *Who*. Retrieved from http://www.who.int/tb/challenges/ltbi_factsheet_2014.pdf?ua=1
- WHO. (2017). *WHO treatment guidelines for isoniazid- resistant tuberculosis*.
- World Health Organisation. (2014). *Companion handbook to the WHO guidelines for the programmatic management of drug-resistant tuberculosis*. Geneva: WHO.
- World Health Organization. (2016). Framework of Indicators and Targets for Laboratory Strengthening Under the End Tb Strategy.
- World Health Organization. (2013). *Definitions and reporting framework for tuberculosis–2013 revision*. Geneva: WHO. Retrieved from http://apps.who.int/iris/handle/10665/79199
- World Health Organization. (2015a). Implementing the End TB Strategy: The Essentials, 1–130. https://doi.org/10.1017/CBO9781107415324.004
- World Health Organization. (2015b). WHO | Recommendation on 36 months isoniazid preventive therapy to adults and adolescents living with HIV in resource-constrained and high TB and HIV-prevalence settings: 2015 update, 30.
- World Health Organization. (2016). *WHO treatment guidelines for drug-resistant tuberculosis*. *Geneva, Switzerland:* Geneva: World Health Organisation.