MOH/F/FAR/184.26(GU) - e

MINISTRY OF HEATLH MALAYSIA
PHARMACEUTICAL SERVICES PROGRAMME

RETROVIRAL DISEASE (RVD) PHARMACY SERVICES PROTOCOL

ADULT AND PAEDIATRIC

THIRD EDITION

2026

PUBLICATION:
THIRD EDITION (JANUARY 2026)

No. Siri Penerbitan KKM: MOH/F/FAR/184.26(GU) - e
No. Pendaftaran Dokumen PPF: A-GU-63

eISBN 978-967-2854-74-6

PUBLISHED BY:
Pharmaceutical Services Programme
Ministry of Health (MOH) Malaysia
Lot 36, Jalan Prof Diraja Ungku Aziz,
46200 Petaling Jaya,
Selangor, Malaysia.
Tel: 603 – 7841 3200
Website: www.pharmacy.gov.my

DISCLAIMER
This protocol is designed to serve as a guide for pharmacists managing adult and paediatric Retroviral Disease Pharmacy services. All information presented in this protocol is constantly evolving concurrently with ongoing research and clinical experiences, which are often subjected to professional judgements and interpretation according to specific clinical situations. The editors and publisher of this protocol have made every effort to ensure the accuracy and completeness of the contents. However, the editors and publisher are not responsible for any errors or omissions, and/or consequences arising from the use of this pocket guide. The application of information from this protocol in any situation remains the professional responsibility of the practitioner.

PREFACE

ZUHAINI BINTI MUKRIM
Director
Pharmacy Practice & Development Division,
Pharmaceutical Services Programme
Ministry of Health, Malaysia

The management of retroviral disease (RVD), particularly Human Immunodeficiency Virus (HIV), continues to evolve with advances in pharmacotherapy, diagnostics, and patient-centered care models. As we move towards achieving national and global health targets, including the UNAIDS 95-95-95 goals, the role of pharmacy professionals in optimizing antiretroviral therapy (ART) has never been more critical.

This updated protocol for the Medication Therapy Adherence Clinic (MTAC) for Retroviral Disease serves as a comprehensive guide for pharmacists managing both adult and paediatric patients living with HIV. It provides standardised, evidence-informed practices to ensure consistent, high-quality pharmaceutical care across all levels of the healthcare system.

Developed through collaborative efforts among subject matter experts, front-line pharmacists, infectious disease physicians, and public health stakeholders, this protocol emphasizes not only clinical pharmacology and medication adherence, but also counselling, stigma reduction, and holistic support. Special considerations for paediatric populations, including caregiver involvement, developmental needs, and dose adjustments, are carefully integrated to address the nuances of managing RVD in children.

This document reinforces our commitment to excellence in pharmaceutical care and aligns with the Ministry of Health's strategic objectives to improve treatment outcomes, reduce transmission, and enhance the quality of life for people living with HIV.

I extend my sincere appreciation to the dedicated team involved in the development and review of this protocol. Your contributions reflect the highest standards of clinical practice and dedication to public health. It is my hope that this protocol will empower pharmacists to lead with confidence, compassion, and clinical rigour in the fight against HIV.

ADVISORS

ZUHAINI BINTI MUKRIM
Director
Pharmacy Practice & Development Division,
Pharmaceutical Services Programme
Ministry of Health, Malaysia

SYAHIDA BINTI CHE EMBI
Deputy Director
Pharmacy Practice and Development Division
Pharmaceutical Services Programme
Ministry of Health, Malaysia

EDITORIAL BOARD AND CONTRIBUTORS

(Alphabetical order)

ANITHA RAMADAS
Hospital Kuala Lumpur

CHEE YUN LEE
Hospital Sultanah Aminah

CHIN SUK YEN
Hospital Tunku Azizah

CHOONG LAI YUAN
Hospital Raja Permaisuri Bainun

ENG MAY FERN
Hospital Pulau Pinang

INTAN SHAFIZA ROMLI
Hospital Sultanah Bahiyah

KOO KAITIAN
Hospital Tunku Azizah

KOO TENG WAI
Klinik Kesihatan Kuala Lumpur

KWAN EE WEI
Hospital Tengku Ampuan Afzan

LIM EE ELAINE
Hospital Raja Perempuan Zainab II

LUKMAN NUL HAKIM MD KHAIRI
Hospital Sultanah Nur Zahirah

MARDHIYAH KAMAL
Pharmacy Practice and Development Division
Pharmaceutical Services Programme

MARZIATY SHAZREENA MOHD SHAH
Pharmacy Practice and Development Division
Pharmaceutical Services Programme

MUHAMMAD AZIZE JANTAN
Hospital Melaka

NUR AMIIRAH ROSLI
Hospital Sungai Buloh

SITI MAHANIM SHAIK ISMAIL
Hospital Tengku Ampuan Rahimah

SOLIHA ZAINAL ABIDIN
Hospital Tuanku Ja'afar

TAY EE FEN
Hospital Umum Sarawak

TEOH YU XIN
Hospital Raja Perempuan Zainab II

TUAN NORHAFIZA TUAN MAT
Hospital Tumpat

WARDAH MOHAMMAD LAMAPPANGANRO
Hospital Tuanku Fauziah

WONG AI WEI
Hospital Queen Elizabeth

EXTERNAL REVIEWERS

DATO.' DR. SURESH KUMAR A/L CHIDAMBARAM
Consultant Infectious Disease and
Head of Infectious Disease Specialty
Hospital Sungai Buloh

DATO' DR. CHOW TING SOO
Consultant Infectious Disease
Hospital Pulau Pinang

DR. KHAIRIL ERWAN KHALID
Consultant Infectious Disease
Hospital Kuala Lumpur

DR. NAZEDAH BINTI AIN @ IBRAHIM
Pharmacist
Hospital Tunku Azizah

DR. MOHD FARIZH CHE PA
Clinical Pharmacist
Hospital Tengku Ampuan Rahimah

GLOSSARY

AIDS	:	Acquired immunodeficiency syndrome
ART	:	Antiretroviral therapy
CMV	:	Cytomegalovirus
COC	:	Circle of confidentiality
ED-PrEP	:	Event driven - Pre-exposure prophylaxis
eGFR	:	Estimated glomerular filtration rate
FDC	:	Fixed-dose combination
HBsAg	:	Hepatitis B surface antigen
HCV	:	Hepatitis C virus
HIV	:	Human immunodeficiency virus
IRIS	:	Immune reconstitution inflammatory syndrome
MAC	:	*Mycobacterium avium* complex
MASHM	:	Malaysian Society of HIV Medicine
MSM	:	Men who have sex with men
MTAC	:	Medication therapy adherence clinic
MOH	:	Ministry of Health

GLOSSARY

NGO	:	Non-governmental organisation
OI	:	Opportunistic infection
OPIM	:	Other potentially infectious material
PCI	:	Pharmaceutical care issues
PEP	:	Post exposure prophylaxis
PLHIV	:	People living with HIV
PrEP	:	Pre-exposure prophylaxis
PRVD	:	Paediatric retroviral disease
PWID	:	People who inject drugs
RVD	:	Retroviral disease
STI	:	Sexually transmitted infection
TB	:	Tuberculosis
TDF	:	Tenofovir Disoproxil Fumarate
TDF/FTC	:	Tenofovir Disoproxil Fumarate / Emtricitabine
U=U	:	Undetectable = Untransmittable
VL	:	Viral load

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

GENERAL OBJECTIVES

01 To optimise the benefits of antiretroviral therapy (ART) medications and other therapies related to People Living with HIV (PLHIV).

02 To increase patient adherence to ART and their knowledge on disease and medications.

03 To assist patients to recognize and manage adverse drug effects due to their medications.

04 To be a source of information for patients/caregivers.

05 To collaborate with physicians and other healthcare professionals in pharmacotherapy management of PLHIV.

SCOPE OF SERVICE

Retroviral disease pharmacy service consists of ART counselling for adult and paediatric patients in both outpatient and inpatient settings.

Pharmacists who are part of this service will perform a multitude of duties during the session: patient assessment, pharmaceutical care issues (PCI) identification, recommendation and intervention, documentation, and patient education/counselling.

Activities carried out should be structured according to the suggested workflow (refer Appendix 1, 2 and 3).

INTRODUCTION

Human Immunodeficiency Virus (HIV) infection remains a major global public health issue. In 2023, there were an estimated 39.9 million PLHIV and 630,000 of them died from HIV-related causes. HIV infection leads to progressive immune destruction as a result of persistent viral replication. Without treatment, it can lead to potentially life-threatening infections and illnesses called Acquired Immunodeficiency Syndrome (AIDS).

There is currently no cure for HIV infection. However, it can be treated with ART. ART has been shown to improve CD4 cell count, reduce viral replication, reduce the frequency of opportunistic infection, improve quality of life and hence, prolong life expectancy of PLHIV.

Through collaboration with other healthcare providers, pharmacists play an important role in providing pharmaceutical care to HIV patients in order to achieve a better therapeutic outcome. By adopting pharmaceutical care, a pharmacist needs to cooperate with the patient and other health professionals in planning specific therapeutic outcomes for the patient.

HIV INFECTION IN ADULT

Anyone, at any age, can get HIV. HIV can spread through different routes:

- Sexual transmission (eg, vaginal/frontal or anal sex without a condom).
- Contact with infected blood (eg, through sharing of needles and via contaminated blood through blood transfusions).
- Mother-to-child transmission (if the mother is not on effective ART).

HIV screening and diagnostic testing are essential for timely initiation of ART and transmission prevention. Immediate ART initiation may not be advisable if a serious untreated opportunistic infection is present, specifically one involving the central nervous system. Without treatment, PLHIV can also develop severe illnesses such as tuberculosis, cryptococcal meningitis or severe bacterial infections and eventually AIDS.

PLHIV are subject to long-term management and a complex care process. They are clinically, socially and emotionally vulnerable, face many challenges, and are often stigmatised. Multidisciplinary team approach is very important in the HIV care cascade process.

Antiretroviral drugs given to people without HIV can prevent infection. When given before possible exposures to HIV it is called pre-exposure prophylaxis (PrEP) and when given after an exposure it is called post-exposure prophylaxis (PEP). People can use PrEP or PEP when the risk of contracting HIV is high with consultation from a clinician.

HIV INFECTION IN PAEDIATRIC

The pathogenesis of HIV infection and the general virologic and immunologic principles underlying the use of antiretroviral therapy in paediatrics are similar to adults. However, there are some unique considerations for HIV-infected infants, children and adolescents as stipulated below:

- Acquisition of infection through perinatal exposure for many infected children.
- In utero, intrapartum and/or postpartum neonatal exposure to zidovudine and other antiretroviral medications in most perinatally infected children.
- Requirement for the use of HIV virologic tests to diagnose perinatal HIV infection in infants under the age of 18 months.
- Age-specific differences in CD4 cell counts.
- Changes in pharmacokinetic parameters with age caused by the continuing development and maturation of the organ systems involved in drug metabolism and clearance.
- Differences in the clinical and virologic manifestations of perinatal HIV infection secondary to the occurrence of primary infection in growing, immunologically immature persons.
- Special considerations associated with adherence to antiretroviral treatment for infants, children and adolescents.

As children living with HIV grow older, there will be new challenges in medication adherence as they go through the adolescent phase. During this phase, adolescents establish new patterns of behaviour and lifestyle changes which might affect their medication taking behaviour. Care needs to be taken to address new adherence issues to prevent development of drug resistance

DISEASE DISCLOSURE STATUS

HIV disease disclosure to adult patients will be carried out by a medical practitioner. Disease disclosure status for adult patients to others is a personal choice that can depend on factors such as individual comfort, the relationship of the person being informed and potential consequences. In many jurisdictions, there are laws regarding disclosure of HIV status especially in contexts such as sexual relationships or healthcare settings. Healthcare providers are typically bound by laws and ethical standards to protect patient information. Individuals should also be mindful of whom they choose to disclose their status to.

Disease disclosure status in children living with HIV is one of the crucial factors that affect medication adherence in paediatric patients. Thus, pharmacists should be aware of the importance of maintaining patient confidentiality throughout the counselling session. A paediatric RVD (PRVD) pharmacist should assess not only patient readiness (in older children) to adhere to medication therapy, but also the willingness of the caregiver to make sure medications are served correctly and discuss other medication related factors.

Disclosure of HIV infection status to children and adolescents should take into consideration their age, psychosocial maturity, the complexity of the family dynamics and the clinical context. The paediatrician will discuss and plan the process for disclosure with the parents/family members and assess the child's knowledge and coping capacity. The process of disclosure will be individualised to include a child's cognitive ability, developmental stage, clinical status and social circumstances.

DISEASE DISCLOSURE STATUS

Disclosure of the disease status may lead to stigmatisation, discrimination or ostracism toward the child and other family members. Hence, pharmacists should be aware of the child's disease disclosure status while conducting counselling sessions and concerned about the impact of the disclosure on the child's emotional health.

Table 1: Partial Disclosure and Full Disclosure of RVD Status (Paediatric)

	Partial Disclosure	Full Disclosure
Age	• ⩾ 7 years old. • Depends on the child's psychosocial maturity.	• ⩾ 12 years old. • Depends on the child's cognitive and emotional understanding of illness and dying. • Also depends on the parent's/ caregiver's readiness.
Introduce the child to	• Germs ~Virus. • Germs fighters ~ CD4. • Pharmacist MUST NOT mention 'HIV'/'AIDS' during the counselling session.	• HIV

PHARMACIST
ROLE AND RESPONSIBILITY

Pharmacists are involved in the pharmaceutical care of the patient diagnosed with HIV infection through collaboration with other healthcare providers (e.g. infectious disease consultant/paediatrician, physician, medical officers, nurses, occupational therapist and social workers) in the management of retroviral disease.

Pharmacists play an important role in providing effective communication with patients and/or caretakers to ensure comprehensive delivery of pharmaceutical care.

- Assess patient and caregiver's readiness for ART initiation.
- Assist in designing therapeutic plans by taking into consideration pharmacodynamic and pharmacokinetic issues, palatability, lifestyle changes and social implications.
- Provide ongoing monitoring of drug adherence and identify potential social stressors that may impair adherence.
- Identify medication-related issues/problems.
- Review laboratory results to monitor ART efficacy and identify potential drug toxicities.
- Identify potential and actual drug-drug/drug-food interactions and suggest relevant pharmaceutical care recommendations.
- Document relevant issues and/or pharmaceutical care intervention and maintain patient confidentiality at all times.
- Identify barriers contributing to non-adherence
- Regular communication with prescribers to improve pharmaceutical care delivery.
- Impart effective non-verbal communication skills during counselling e.g. empathy, acceptance, good listening skills and unbiasedness.

RECRUITMENT CRITERIA

All patients diagnosed with HIV including:

a. Patients newly started on ART.
b. Patients requiring changes in ART in the ward or clinic.
c. Non-adherent patients or patients with potential adherence problem (e.g: late refill prescription)

LOCATION/SETTING

Outpatient

The Retroviral Disease (RVD) Medication Therapy Adherence Clinic (MTAC) service shall be conducted at:

- Medical/ Infectious Disease/Paediatric Outpatient Clinic or in a location that ensures patient privacy and confidentiality.
- Location shall be within reach of patient's case notes, physicians and other healthcare personnel involved in patient management.

Inpatient

RVD pharmacy counselling shall be conducted for any in-ward patient who is referred for counselling.

PERSONNEL REQUIREMENT

- RVD pharmacy service shall be provided by trained pharmacist(s) who have undergone a training program approved by Pharmaceutical Services Program, MOH Malaysia.
- However, pharmacists who have not undergone training shall work directly under the supervision of a trained pharmacist or any experienced pharmacist from the related field.
- The number of pharmacists shall depend on the number of patients scheduled per day with a minimum of one pharmacist during each RVD MTAC session. Additional pharmacist may be required in facilities where dispensing and pill count activities are performed.
- Preferably, a facility should develop a designated team of pharmacists especially when involving medication dispensing during MTAC sessions.

COUNSELLING TOOLS

The use of counselling tools (pamphlets, flipchart, medication chart, etc) are encouraged to assist patient comprehension.

Pharmacists shall provide relevant educational material on ART to patients diagnosed with HIV or caretaker, if available.

APPOINTMENT

Appointment

- All appointments will be scheduled by pharmacists or other healthcare providers participating in the clinic. For patients who are unable to attend physical appointments, pharmacists may schedule and conduct virtual counselling.
- Virtual counselling can be done depending on the suitability of the setting in each facility (eg. video conference) and the flow of the counselling may differ from one facility to another.

Missed Appointment

Patients who missed their appointments will be marked as defaulters and will be rescheduled accordingly.

DISCHARGE CRITERIA

Patients will be discharged from RVD/PRVD MTAC only if patients deceased or transferred out to other Ministry of Health (MOH) facilities for follow-up.

WORK PROCESS FOR RVD MTAC

(Refer Appendix 1 & 2)

INPATIENT PHARMACY COUNSELLING FOR ART

Most PLHIV are admitted to the hospital due to opportunistic infections (OIs) or ART-related adverse events. ART may be started during hospitalisation among newly diagnosed HIV patients. Pharmacists play a crucial role in counselling PLHIV.

In the ward, the pharmacist shall perform the following:

1. **Counsel the patients at bedside and/or upon discharge on ART** (Refer to Appendix 3)

2. I**ntroduce the concept of OIs**

- Emphasise that people with HIV are more susceptible to these infections due to their weakened immune systems.
- Stress the importance of preventive measures, such as adhering to ART, practising good hygiene, and avoiding risky behaviours.

3. F**ollow-up monitoring**

   For discharged patients who need further counselling, use Patient Referral Notes (CP4)

4. M**aintain patient confidentiality:**

   Ensure privacy and communicate confidential information only among members of the patient's circle of confidentiality (COC).

COUNSELLING

i. Counselling on pre-ART and ART initiation

General Counselling

Explore patient/caretaker readiness for ART.

1. Pre-ART counselling is conducted only for patients newly diagnosed with HIV and requires a delay in ART initiation.
2. Counselling points for pre-ART initiation/ART initiation are as in ART Counselling Checklist (refer appendix B1).

Explore patient/caretaker knowledge, perception and belief on ART. To provide and re-evaluate patient/caretaker education on:

1. HIV/AIDS including difference between HIV and AIDS, mode of transmission and viral replication.
2. Target CD4 count and viral load (VL)
3. Association of CD4 count and VL to the disease
4. Role of ART in suppressing VL and improving CD4 cell count. Emphasize to patients ART medication does not cure the disease.
5. Combination of ART medication prescribed to patient:
    a. Explain on the prescribed ART regimen.
    b. Elaborate on the importance of ART combination.

COUNSELLING

i. Counselling on pre-ART and ART initiation (cont)

c. Duration of time when ART medication will show its effect (usually 4 months after starting ART).
d. Common side effects/adverse effects of ART medication and its management.
e. Potential drug-drug/drug-food interaction including non-prescription medications, supplements and traditional medicines.

6. Purpose and importance of opportunistic infection (OI) prophylaxis in the prevention of OI.
7. Correct medication storage and disposal of unused/expired medication in accordance to MyMediSAFE programme by Ministry of Health Malaysia.
8. Importance of patient adherence to prevent drug resistance and drug cross-resistance.
9. Lifelong commitment towards ART medication.
10. MOH policy in supplying ART medication.
11. Explain on Immune Reconstitution Inflammatory Syndrome (IRIS)
    a. Patient has potential to experience IRIS when CD4 count <100 cells/µl)
    b. Patients may develop common OI such as tuberculosis (TB), Mycobacterium avium complex (MAC), Cytomegalovirus (CMV) or cryptococcal meningitis during this period.
    c. IRIS is a transition period before patients get better (inform patients that they may get worse before getting well).
    d. ART medications are working even though there is an infection

COUNSELLING

i. Counselling on pre-ART and ART initiation (cont)

e. Remind caregivers for paediatric patients diagnosed with HIV to avoid mixing ART into milk.

f. Advise patients to eat only fully-cooked meals and boiled water as bacteria may be present in half-cooked meals.

g. Maintain good hygiene.

h. Educate and motivate patients on positive reinforcement on life (e.g.: Undetectable=Untransmittable (U=U)).

i. Advise patients to avoid pet faeces (dog/cat etc).

j. Discuss the effects of high-risk behaviours and activities e.g : Alcohol consumption - risk of interaction with ART and may affect liver function test (LFT).

k. Recreational drugs - may affect patient's ability to take ART on time & carries a risk of drug - drug interaction.

l. Methadone - carries a risk of drug-drug interaction and may require dosing adjustments. It is advised to enrol in a methadone maintenance therapy programme for better monitoring.

m. Sexual activities - emphasize safe sex (e.g: condoms) and seek counselling if needed.

ii. Counselling on ART Monitoring

ART Monitoring : During subsequent visits.

Patients who have just initiated/switched regimes will be scheduled to return for a more frequent follow-up assessment (every 2 weeks to 3 monthly based on pharmacist judgement) until VL is well suppressed to address adherence or drug related issues. Patients who are stable on treatment can then be scheduled for follow-up sessions every 6 to 12 months. To re-emphasize or include Pre/Initiation of ART counselling points to patients if needed.

Medication Reassessment

Pharmacist shall re-assess and re-counsel the following (if applicable):

1. Identification of medications.
2. Administration of medications (including time of administration).
3. Patient's understanding on CD4 and VL.
4. Lifestyle and hygiene practice
5. Storage condition of medication and disposal of unused/expired medications accordance to myMediSafe programme.
6. Any recent missed/delayed doses (in the last one month) or non-adherence issues from previous records. Pill count shall be performed if necessary.
7. Discuss on the use of reminders e.g. smartphone, alarm clock.
8. Discuss solutions to overcome non-adherence.
9. Intensive counselling for patients with late medication refills.
10. Assess patients for any adverse events experienced from current ART.
11. Identify, address, manage and monitor any drug-related issues.

iii. Counselling on Regimen Switch

1. Patients shall be re-counselled if there is a change of ART regimen.
2. Explain reasons for changing ART regime such as presence of adverse effects or treatment failure.
3. Possible factors that may contribute to treatment failure will be informed to patients.
4. Counselling points may be repeated as outlined in points i. (page 24) and ii. (page 27), of necessary.

Refer **Appendix B1** for ART Counselling Checklist.

PRE-EXPOSURE PROPHYLAXIS (PrEP)

Introduction

Pre-exposure prophylaxis (PrEP) for HIV involves the use of HIV medications (co-formulated tenofovir disoproxil fumarate with emtricitabine [TDF/FTC]) by people who are HIV negative prior to high-risk events to prevent infection through sexual contact or needle sharing. When taken once daily, PrEP can reduce the risk of HIV transmission by up to 99% for men who have sex with men (MSM). Among heterosexual partners, it reduces transmission by at least 75%. In injecting drug users with high adherence, tenofovir disoproxil fumarate (TDF) alone is 74% effective. PrEP should be considered after a thorough assessment of current HIV status and potential contraindications. Ideally, it should be part of a comprehensive preventive service that includes adherence counselling and screening for other sexually transmitted infections (STIs).

Indications for PrEP

Table 2: PrEP indications by population

Persons recommended for PrEP	PrEP indications
MSM	Sexually active within the last 6 months, with any of the following: • a partner who is HIV positive*. • inconsistent use of condoms (for either insertive or receptive anal sex). • an STI (syphilis, gonorrhoea or chlamydia) in the last 6 months. • individuals requesting PrEP.
Heterosexual (men or women)	Sexually active within the last 6 months, with any of the following: • a partner who is HIV positive*. • inconsistent use of condoms with partners of unknown status from high risk groups (MSM, intravenous drug user, sex worker, transgender) • an STI (syphilis, gonorrhoea or chlamydia) in the last 6 months.
Transgender (men or women)	Sexually active within the last 6 months, with any of the following: • a partner who is HIV positive*. • inconsistent use of condoms with partners of unknown status (for either insertive or receptive anal sex). • an STI (syphilis, gonorrhoea or chlamydia) in the last 6 months.
People who inject drugs (PWID)	With any of the following: • the use of shared drug injecting equipment. • at risk of HIV acquisition from sex.

*If the HIV-positive partner is on effective ART for ⩾6 month and VL<200 copies/L, studies have shown no risk of transmission, and PrEP is not required.

Indications for PrEP (cont)

However, PrEP can provide additional protection in certain situations:

1. As a bridge when the HIV-infected partner has been taking ART for < 6 months.
2. If the partners' treatment status or viral load is unknown.

Starting and continuing PrEP

People who are at risk of HIV acquisition through sexual exposure may be offered either daily oral PrEP or oral event-driven PrEP (ED-PrEP) (also known as "2+1+1") as options. The choice can be tailored to the individual's circumstances and preferences. TDF/FTC remains the most commonly prescribed medication for PrEP, including for people who inject drugs (PWID) who meet the criteria for its use. While testing for hepatitis B virus is strongly encouraged, chronic hepatitis B infection is not a contraindication for using TDF-based daily oral PrEP or oral ED-PrEP.

When first starting (or re-starting) PrEP, it is recommended that the initial prescription is for a 90-day supply of TDF/FTC. This approach encourages clients to undergo repeat HIV testing and return for clinical review and treatment monitoring.

1. Daily dosing PrEP

The fixed-dose combination of TDF/FTC (300mg/200mg) in a single daily dose, is approved for PrEP in healthy adults and adolescents at risk of acquiring HIV. This regimen should start with a lead-in dose for 7 days.

Starting and continuing PrEP (cont)

2. Oral event-driven PrEP (ED-PrEP)

Cisgender men, trans and gender diverse people assigned male at birth who are not taking exogenous estradiol-based hormones may be offered oral daily PrEP (Table 2) or ED-PrEP (Figure 1-3) as options. The advised dosing are:

- A loading dose of two tablets of TDF/FTC taken 2–24 hours before sex, followed by a third (one) tablet 24 hours and a fourth (one) tablet 48 hours later.
- Where potential exposure is sustained > 24 hours, one tablet once a day should be taken until the last sexual intercourse, followed by the two post-exposure tablets.
- When re-starting PrEP, take a loading dose of two tablets. If the last PrEP dose was <7 days, to take a loading dose of one tablet.

Stopping PrEP

Stopping PrEP should be done carefully, with specific considerations to ensure the patient remains protected from HIV acquisition until they're no longer at significant risk.

- Daily dosing: 7 days after last sex/high risk exposure
- Event-driven: 48 hours after last sex

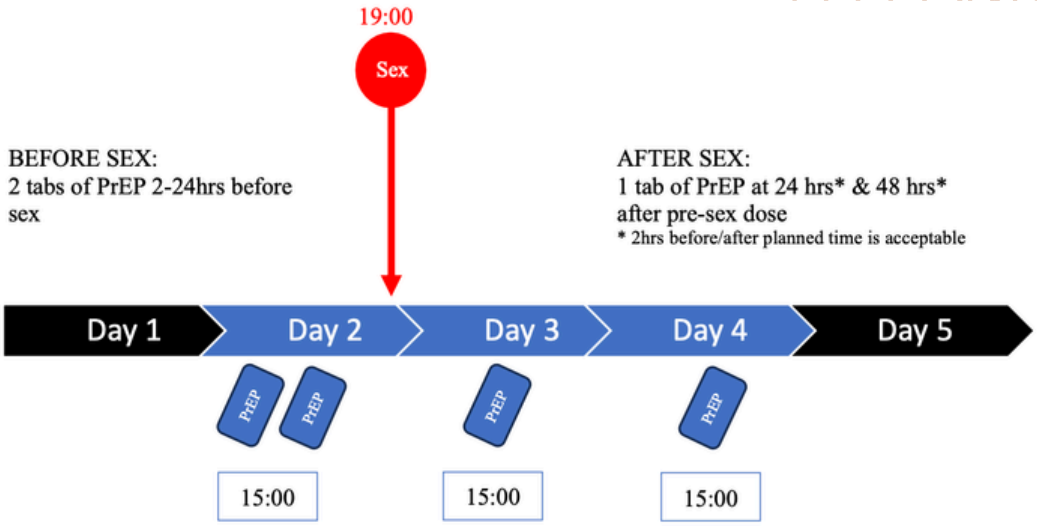


Figure 1: Event-driven PrEP dosing if sex occurs once a week

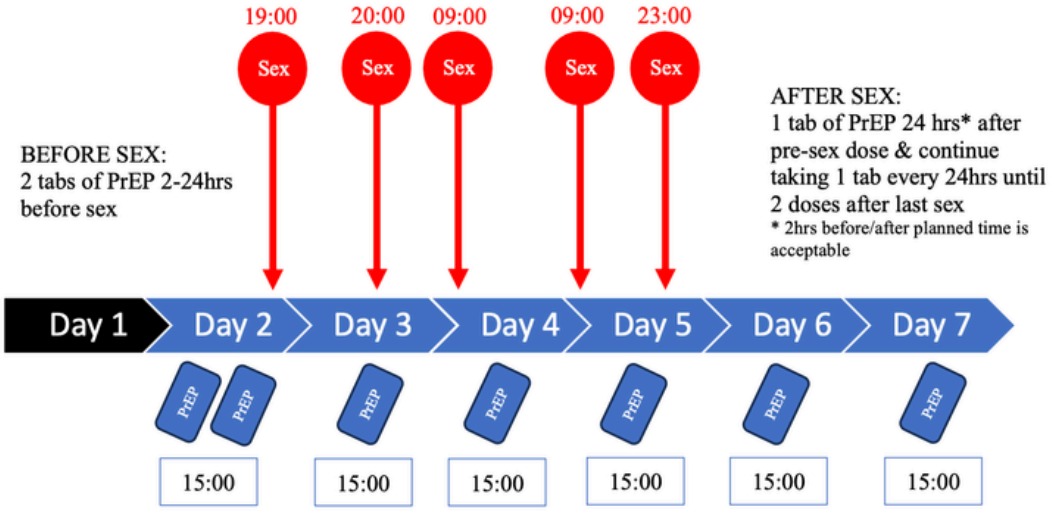


Figure 2: Event-driven PrEP dosing if sex occurs several times during a week

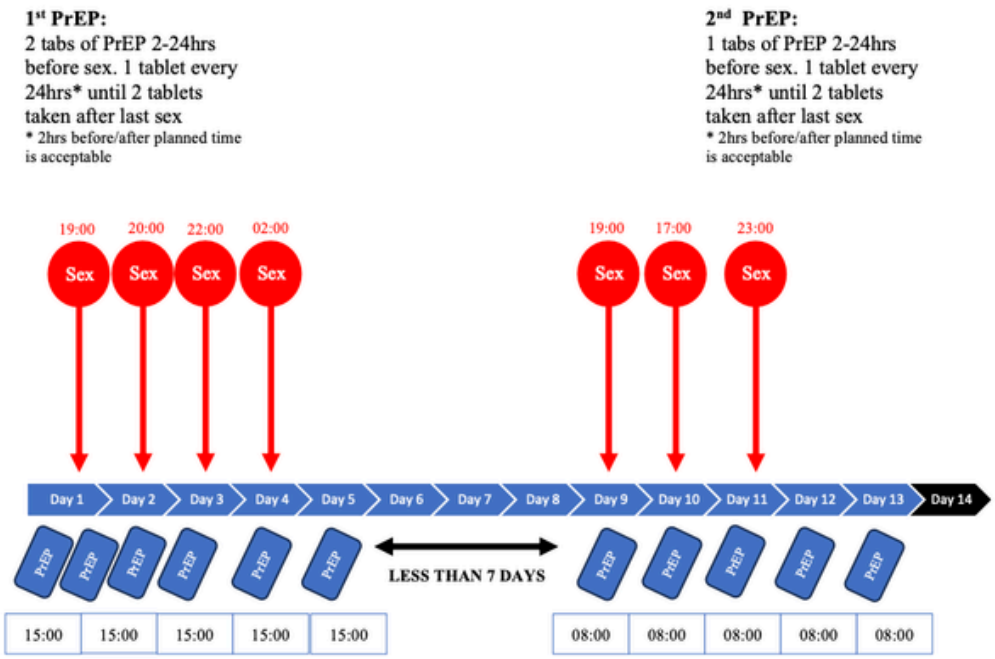


Figure 3: Event-driven PrEP dosing if sex occurs several times during a week and then more sex within a week

Table 3: Starting, using and stopping TDF-based oral PrEP

Population	Starting PrEP	Continuing PrEP	Stopping PrEP
Daily Dosing PrEP			
• Cisgender women • Trans and gender diverse people assigned female at birth[a] • Cisgender men taking exogenous estradiol-based hormones • Trans and gender diverse people assigned male at birth[a] taking exogenous estradiol-based hormones • PWID	1 tablet OD x 7/7 before potential exposure	1 tablet OD	1 tablet OD x 7/7 after the last potential exposure
Event-driven			
• Cisgender men • Trans and gender diverse people assigned male at birth[a] who: a. have sexual exposure **AND** b. not taking exogenous estradiol-based hormones	2 tablets 2–24 hours before potential sexual exposure (ideally closer to 24 hours before potential exposure)	1 tablet OD	1 tablet OD x 2/7 after the day of the last potential sexual exposure

a"Trans and gender diverse people" is an umbrella term for those whose gender identity, roles and expression does not conform to the norms and expectations traditionally associated with the sex assigned to them at birth; it includes people who are transsexual, transgender, or otherwise gender nonconforming or gender incongruent. Transgender people may self-identify as transgender, female, male, transwoman or transman, trans-sexual or one of many other gender nonconforming identities.

Adapted from: Differentiated and Simplified Pre-Exposure Prophylaxis for HIV Prevention: Update to WHO Implementation Guidance: Technical Brief 2022

Contraindication

1. Estimated glomerular filtration rate (eGFR) < 60 ml/min.
2. HIV positive or evidence of possible acute HIV infection.
3. Known allergies to any of the PrEP components.
4. Unable or unwilling to do follow-up HIV testing and return for safety monitoring visits.

Adverse events

1. Some (<10%) of patients prescribed TDF/FTC experience a “start-up syndrome” that usually resolves within the first month of taking PrEP medication. This may include headache, nausea, or abdominal discomfort.
2. Renal impairment or acute kidney injury, which is typically reversible if PrEP is stopped may also occur.
3. Loss of bone mineral density with prolonged use may also occur.

Monitoring parameters and follow-ups

1. HIV test – at baseline, 1 month, 3 month and every 3-6 months.
   Once HIV infection is confirmed, stop PrEP immediately and refer to a tertiary centre. Resistance test should be done before initiating ART.
2. Renal profile (calculate eGFR) – at baseline, 1 month, 3 month and every 3-6 months. If eGFR<60 ml/min, renal profile must be repeated a separate day before stopping oral PrEP. Discontinue TDF/FTC if persistent eGFR<60 ml/min. If another cause of renal impairment is found and removed, and eGFR>60 ml/min, may consider resuming PrEP with close monitoring.

Monitoring parameters and follow-ups (cont)

3. Hepatitis B surface antigen (HBsAg) – at baseline.
   If a patient is hepatitis B positive, there is a risk of rebound hepatitis B viremia and flare upon discontinuation of PrEP. To monitor liver function tests and clinically when stopping PrEP.
4. Urine pregnancy test (if applicable) – at baseline, 1 month, 3 month and every 3-6 months.
   PrEP in pregnancy and breastfeeding needs to be weighed against the risk of HIV transmission to the child and likely will still be.
5. STI screening by symptoms – at baseline, 1 month, 3 month and every 3-6 months.
6. Anti-Hepatitis C Virus (Anti-HCV) – at baseline

Refer **Appendix B2** for PrEP Counselling Checklist.

POST-EXPOSURE PROPHYLAXIS (PEP)

Introduction

Post-exposure prophylaxis (PEP) for HIV involves the use of HIV medications by people who are HIV negative following exposure to high-risk events to prevent infection. The common exposures include sexual contact (non-occupational exposure) or needlestick/ sharp injuries (occupational exposure).

Indications for PEP

1.Occupational Exposure

- Percutaneous exposure: breach of skin by a sharp object such as hollow-bore, solid-bore, cutting needles or broken glassware that is contaminated with blood, visibly bloody fluids or other potentially infectious materials (OPIM) or that has been from the source patient's blood vessel.
- Bite from a patient with visible bleeding in the mouth that causes bleeding in exposed workers.
- Splash of blood, visibly bloody fluids or OPIM to the mucosal surface.
- Exposure of non-intact skin to blood, visibly fluid or OPIM.

2. Non-Occupational Exposure

- Unprotected vaginal or anal sex.
- Protected sex with condom failure.
- Unsafe needle sharing.
- Non-consensual sex where there is a high probability that the assailant is HIV positive.
- PEP is not recommended if the source is on ART with a confirmed and sustained (> 6 months) undetectable plasma HIV VL.

Initiation and duration of PEP

- Should be initiated as soon as possible after exposure, but can be considered up to 72 hours post- exposure.
- Duration of PEP is 28 days.

Table 4: Choices of ARV in PEP

Occupational Exposure		Non-Occupational Exposure
3-drug regimen	**2-drug regimen***	**3-drug regimen**
TDF/FTC plus DTG	**TDF/FTC**	**TDF/FTC plus DTG**
Alternative: TDF/FTC plus LPV/r or AZT/3TC plus LPV/r	**Alternative:** AZT/3TC	**Alternative:** TDF/3TC/DTG or TDF/FTC plus ATV/r or TDF/FTC plus LPV/r or AZT/3TC plus ATV/r Or AZT/3TC plus LPV/r

*Two drug-regimens are only recommended for occupational exposure where the source already on ART and recent HIV viral load is undetectable.
Key : 3TC = lamivudine; AZT = zidovudine; ATV/r = atazanavir/ritonavir; DTG = dolutegravir; FTC = emtricitabine; LPV/r = lopinavir/ritonavir; TDF = tenofovir

Switching from PrEP to PEP

Switching from PrEP to 3-drug regimen PEP only recommended if:

- When the exposure risk warrants a 3-drug PEP, AND
- Last exposure event occurred within the 72 hour PEP window, AND
- Adherence to PrEP is questionable (<4 doses in the week of exposure or last dose taken more than 7 days ago for anal sex; <6 doses in the week of exposure or last dose taken more than 48 hours ago for vaginal sex)

Recommence PrEP on completion of 28 days of PEP.

PEP Counselling

PEP counselling should be provided by a pharmacist to the patient or caregiver when referred by the prescriber.

Refer **Appendix B3** for PEP Counselling Checklist.

DOCUMENTATIONS

Documentations for RVD/PRVD MTAC, refer to Appendices:

Appendix A1 : RVD/PRVD MTAC Patient Profile

Appendix A2: Patient's Understanding of Medication (DFIT)

Appendix A3: RVD/PRVD MTAC Monitoring Parameter Result

Appendix A4: ART Proportion of Days Covered/Pill Count Chart

Appendix A5: RVD/PRVD MTAC Pharmacist Review

Appendix B1: ART Counselling Checklist (may be used to document for Pre-ART, newly initiated on ART, switch ART regimen or follow-up ART counselling)

Appendix B2: PrEP Counselling Checklist

Appendix B3: PEP Counselling Checklist

***Manual MTAC Form can be exempted in facility with a computerised system.**

LIST OF REFERENCE CHART

Appendix C1 : ART Guidance Chart

Appendix C2: ART Drug Interaction Chart

Appendix C3: Potential Methadone Drug Interactions Chart

Appendix C4: ART Adverse Effects Chart

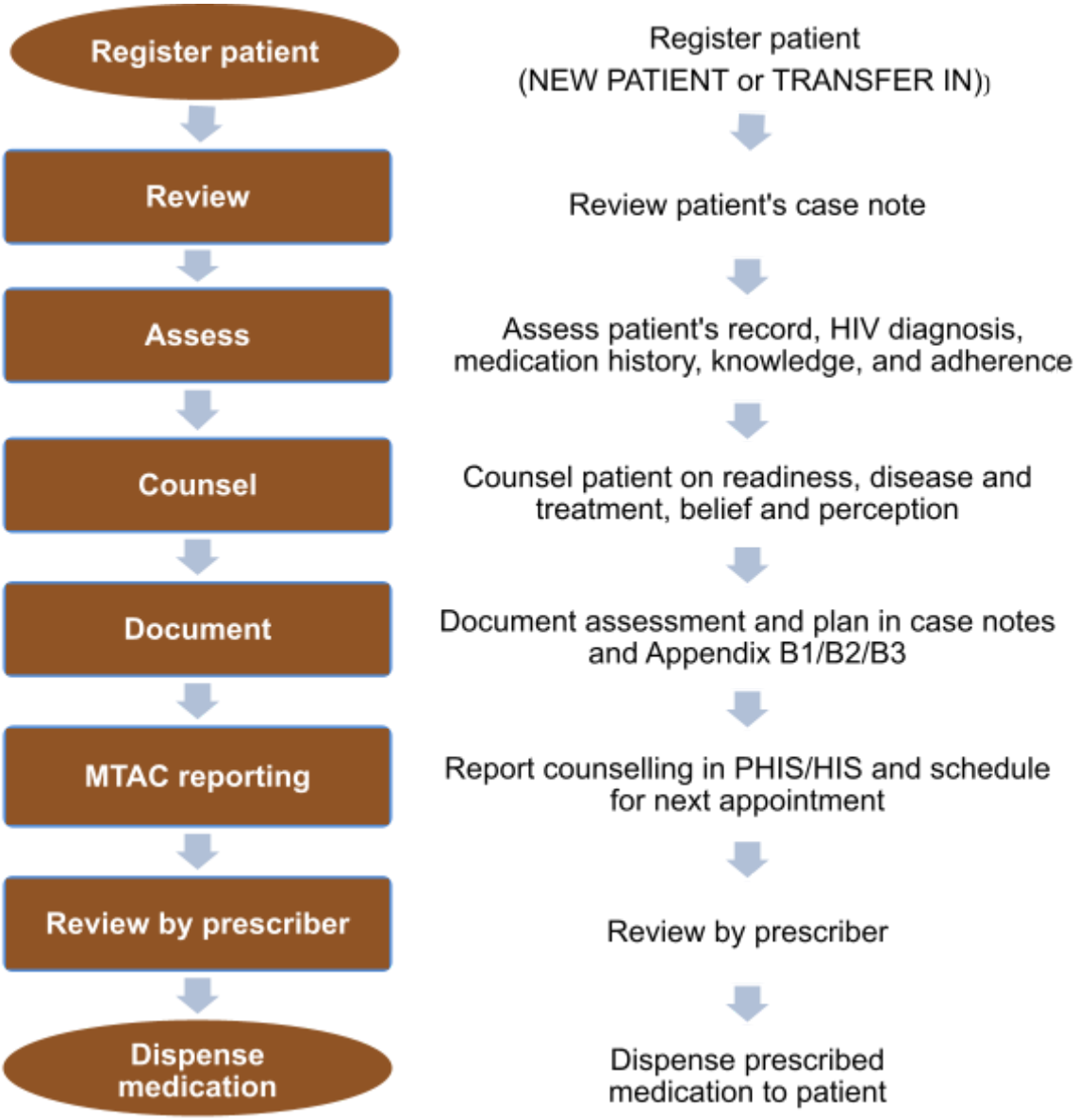
REFERENCES

1. Protocol Medication Therapy Adherence Clinic: Retroviral Disease (Adult & Paediatrics) 2nd Edition. Pharmaceutical Services Division, Ministry of Health; 2014.
2. Malaysian Consensus Guideline on Antiretroviral Therapy 2022. The Malaysian Society for HIV Medicine (MASHM)
3. World Health Organization. Technical brief: Differentiated and simplified pre-exposure prophylaxis for HIV prevention: update to WHO's implementation guidance. World Health Organization; 2022.
4. Preexposure Prophylaxis For The Prevention Of HIV Infection In The United States – 2021 Update Clinical Practice Guideline, Centre for Disease Control and Prevention (CDC)
5. Appropriate Medicines: Options for Pre-Exposure Prophylaxis. Geneva: World Health Organization; 2018.
6. Center for Disease Control and Prevention. Effectiveness of prevention strategies to reduce the risk of acquiring or transmitting HIV. Atlanta, GA: CDC, 2019.
7. Center for Disease Control and Prevention. Preexposure Prophylaxis for the Prevention of HIV Infection in the United States – 2021 Update Clinical Practice Guideline; 2021

APPENDICES

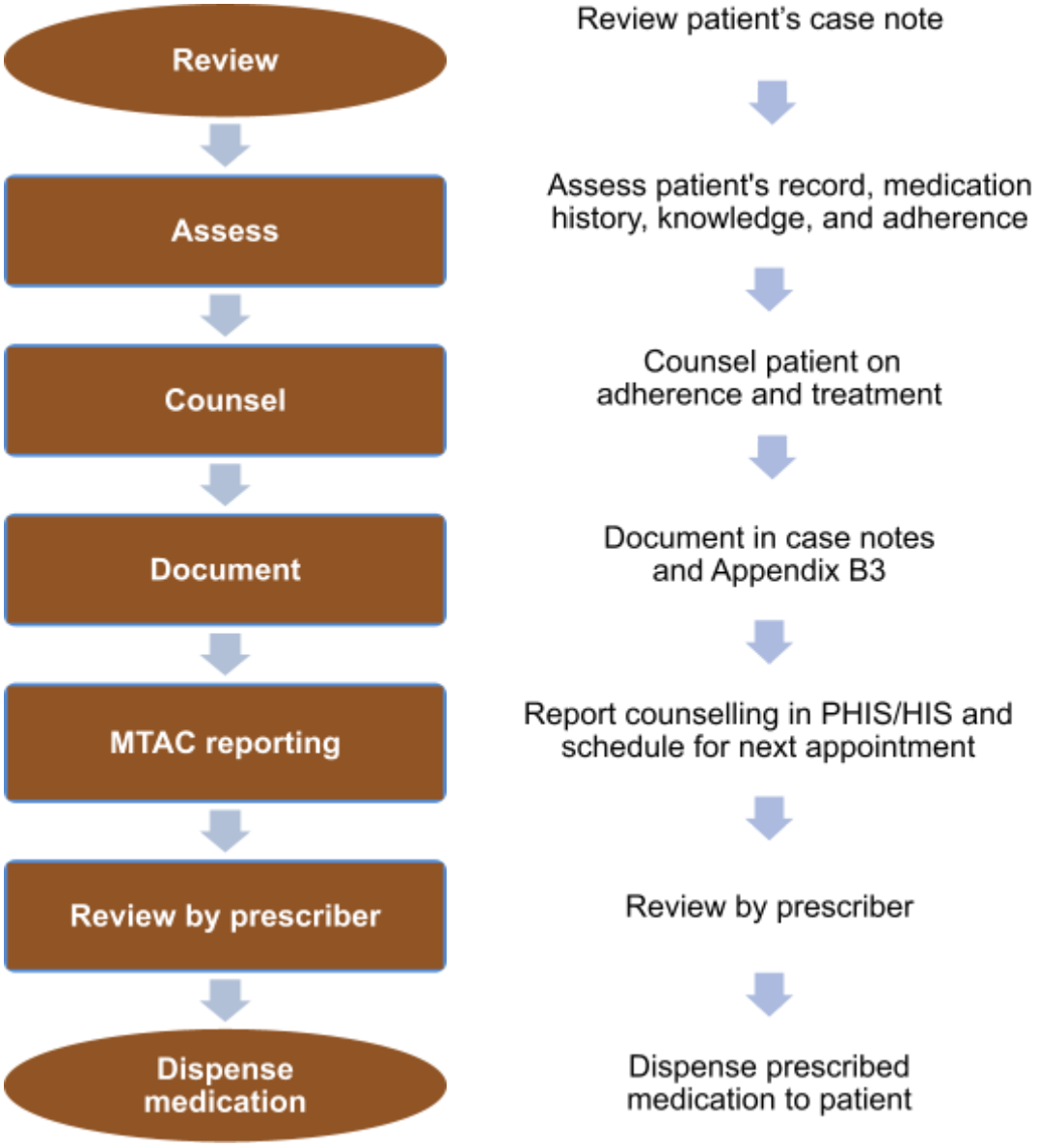
WORKFLOW OF RVD MTAC (ADULT / PAEDIATRIC)

Pre-ART / ART Initiation / ART Regimen Switch



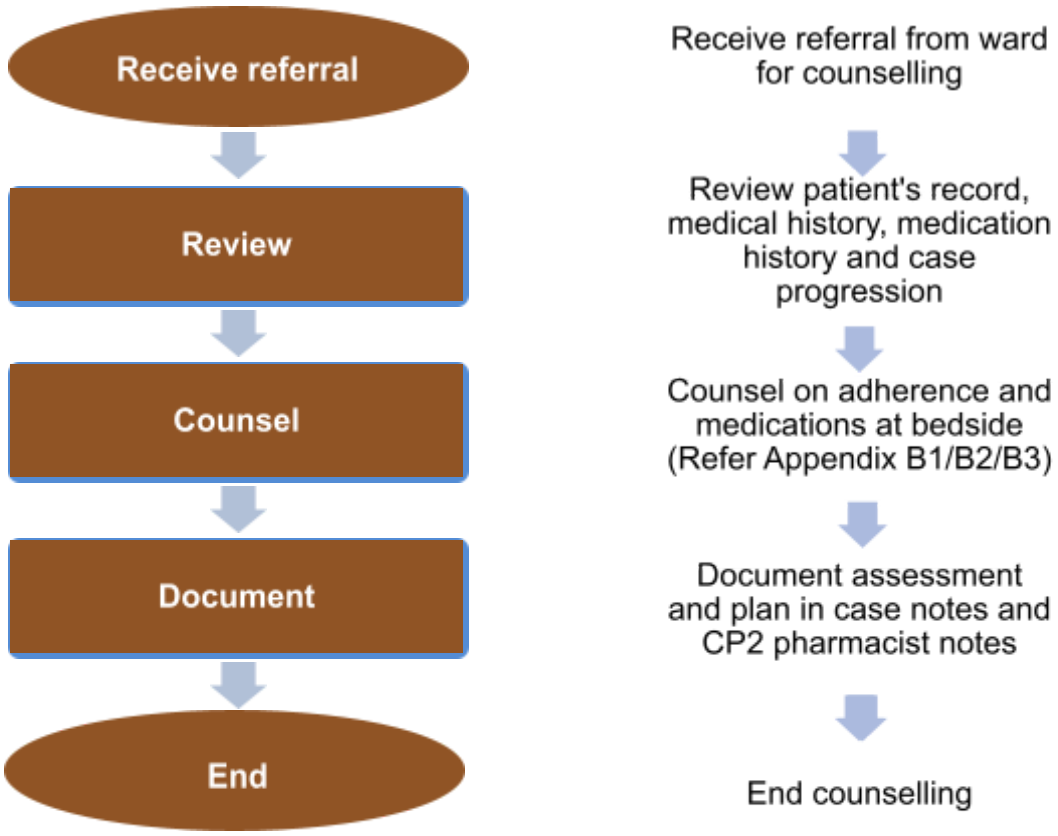
WORKFLOW OF RVD MTAC (ADULT/PAEDIATRIC)

Follow-up ART (Physical OR Virtual Counselling)



WORKFLOW OF INPATIENT PHARMACY COUNSELLING FOR ART (ADULT/PAEDIATRIC)

Pre-ART / ART Initiation / ART Regimen Switch / Follow-up ART



RVD / PRVD MTAC PATIENT PROFILE

HOSPITAL / HEALTH CLINIC :
PATIENT MRN :

PATIENT INFORMATION

Name :					
IC No :		Date of Birth :		Age :	
Address :					
Gender :	[ ] Male [ ] Female	Race :	[ ] Malay [ ] Indian [ ] Chinese [ ] Others : _____		
Tel. No. (House) :		(Mobile) :			
Marital status :	[ ] Single [ ] Married [ ] Divorced [ ] Widowed				
No. of child :					
Occupation :					
Circle of Confidentiality (COC) :					
Caregiver :					
Staying :	[ ] Family (Mother/Father/Siblings/Extended family) : _____ [ ] Partner/Friend(s) [ ] Alone [ ] NGO/Shelter/Social Welfare [ ] Adopted/Foster care [ ] Others : _____				
Social history :					
Habit :	[ ] Smoking : _____ sticks a day [ ] Vaping : _____ puffs/hit a day [ ] Alcohol : _____ consumption/day/week [ ] Illicit drug use : _____				

ALLERGIES / INTOLERANCE
[ ] No Known Drug Allergy (NKDA) [ ] Yes, please specify :

DISCLOSURE OF PRVD STATUS		
Partial : Phase 1 - CD4	Date :	
Partial : Phase 2 - Virus	Date :	
Full disclosure	Date :	

PAST MEDICAL HISTORY			
	Date of diagnosis	Disease	Treatment
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

RETROVIRAL DISEASE HISTORY	
Mode of transmission :	[ ] Heterosexual [ ] Homosexual/Bisexual [ ] IVDU [ ] Blood transfusion [ ] Vertical transmission [ ] Others : _____
Date of diagnosis :	
CD4 nadir :	cells/µl
CD4 before starting ART :	cells/µl
Viral load baseline :	copies/ml

OPPORTUNISTIC INFECTION			
	Date of diagnosis	Type of OI	Treatment
1			
2			
3			
4			
5			
6			
7			
8			

ANTIRETROVIRAL REGIME HISTORY				
	Date start	Date stop	Antiretroviral regime	Reason for changing (if any)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

OTHER MEDICATIONS (INCLUDING OTC, TRADITIONAL, HORMONAL etc.)				
	Date start	Medication	Indication	How often/last use
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Patient's Understanding of Medication (DFIT)

No	Drug	Dose and Frequency	Visit 1				Visit 2				Visit 3				Visit 4				Visit 5				Visit 6			
			Date:				Date:				Date:				Date:				Date:				Date:			
			D	F	I	T	D	F	I	T	D	F	I	T	D	F	I	T	D	F	I	T	D	F	I	T
		Score (%)																								

D = Dose, F = Frequency, I = Indication, T = Method of Administration

Yes = 1, No = 0

Score (%) = No of 'Yes' / No of Questions x 100%

RVD/PRVD MTAC Monitoring Parameter Result									
Date									
ART Regime									
Timing									
Adherence									
Wt (kg)									
Ht (cm)									
BSA (m2)									
CD4 Count (cells/mm3)									
CD4 %									
VL (copies/ml)									
Hb (g/dL)									
Creat (umol/L)									
CrCl (ml/min)									
LDL (mmol/L)									
TG (mmol/L)									
ALP (IU/L)									
ALT (IU/L)									
Others									
Adverse event									

ART Proportion of Days Covered

Hospital / Health Clinic :
Patient name: **RN:**

Dispensing date	ART agent and dose	Sum of days supplied by refills (a)	Number of days in the time period (b)	Days supplied (a) / Number of days (b) x100%	Adherent Y / N	Pharmacist Initial

For new patients or suspected non-adherence cases only. Not compulsory for all cases
Adherence = PDC score ≥ 95%

ART Pill Count Chart

Hospital / Health Clinic :
Patient name: **RN:**

Dispensing date	ART agent and dose	Number of pills Dispensed (a)	Pill count date	Number of pills supposed to be taken (c) (Number of days between dispensing date and pill count date)	Pill balance (b)	Pill count (a-b) / c x100%	Adherent Y / N	Pharmacist Initial

For new patients or suspected non-adherence cases only. Not compulsory for all cases.
Adherence = pill count score ≥ 95

RVD/PRVD MTAC Pharmacist Review

Patient Name: **RN:**

Date	Pharmacist Note	Pharmacist Plan
	Adherence: Adverse event (if any):	
	Adherence: Adverse event (if any):	
	Adherence: Adverse event (if any):	
	Adherence: Adverse event (if any):	
	Adherence: Adverse event (if any):	
	Adherence: Adverse event (if any):	
	Adherence: Adverse event (if any):	

ART COUNSELLING CHECKLIST

HOSPITAL/HEALTH CLINIC: ……

PATIENT NAME: .....

☐ Pre-ART
☐ Initiation
☐ Change regimen
☐ Follow up

NO.	COUNSELLING CHECKLIST (Please tick accordingly)	✔
1	**<u>Knowledge and understanding about HIV</u>** **Pre-ART/Initiation ART counselling: Explain on** 1) HIV/AIDS (*mode of transmission, viral replication*) 2) CD4 3) VL **Follow up counselling ONLY :** 1) Can the patient identify their medications (by name /colour/appearance)? 2) Usage of any reminder tools to help with adherence (handphone alarm/pill box)? 3) Assess their awareness of previous CD4 and VL levels. 4) Evaluate their practice of medication storage**.** (eg : at room temperature, away from children, not to share medications with another individual)	
	Pharmacist's Notes …….. ……	
2	**<u>Evaluation of the patient's readiness, belief, and perception to adhere to medication therapy</u>** 1) Assess patient's readiness, patient's belief & perception about ART. 2) Is the patient taking any supplements/traditional medications? 3) Lifelong commitment – *even when the CD4 count is high, ART cannot be stopped.* **(Reemphasize ART is not to cure)** 4) The first regimen is always the best. 5) Any presence of psychosocial stressors or other barriers that may impair medication adherence. 6) Evaluate caregiver/family support and obtain their additional information.(Consider educating caregivers and family members if HIV status is disclosed) 7) **ART regime change/switch ONLY (Yes/NO)** : explain to the patient the possible reason for change e.g. adverse effects or treatment failure.	
	Pharmacist's Notes …… ……	

3	**<u>ART regimen</u>** 1) Combination of at least 2 different drugs. May give an example of ART drugs. 2) Drug name, dosage, frequency, administration advice and storage (refer to *Appendix C1*). 3) Required duration to see positive outcome i.e., usually 4 months post ART. 4) Highlight the common side effects of ART and how to manage/minimise it. 5) MOH's policy concerning the supply of ART. 6) Purpose and importance of OI prophylaxis (if any) in preventing OIs. ***Note : Follow up counselling - Reemphasize counselling points on ART Regimen**	
	Pharmacist's Notes …… ……	
4	**<u>Re-evaluate, review and reemphasize on adherence of ART and clinic appointments.</u>** 1) Request the patient to let us know their understanding of ART and provide additional information (if necessary). 2) Stress the importance of consistent/proper timing of dose-taking and the implication of non-adherence including the occurrence of drug resistance. 3) Provide medication administration schedule/timetable guide and suggest adherence tools to increase adherence – handphone alarm, alarm clock, pill box, or calendar. 4) Action to be taken in the event of late/missed dose/ vomiting after taking ART 5) Always bring sufficient supply when travelling and whilst overseas (dosing time should follow Malaysia time when it is convenient. Otherwise, switch to a more convenient time over the next few days.) 6) Adherence issue during the fasting month e.g. twice daily dosing ART. 7) Intervene when the patient indicates that they may no be able to adhere to the treatment 8) Advise patients to come for every appointment given by pharmacist and clinic for consultation, check-ups, and blood tests – do not stop medications without prior advice from doctor, pharmacist, or nurse. Therefore, provide the patient clinic's telephone number for any emergency query or appointment. 9) Inform patient on pharmacy value added services (VAS). **For Follow up counselling ONLY :** 1) Ask about the most recent missed/delayed dose (in the last 1 month). 2) Enquire about specific reasons why doses were missed/delayed. 3) Assess medication knowledge and adherence e.g. DFIT, MyMAAT 4) Pill count if able to perform (*Appendix A4*). 5) Suitability of current ART administration timing and make amendments accordingly if necessary.	
	Pharmacist's Notes …….. …….	

5	**<u>IRIS (Immune Reconstitution Inflammatory Syndrome)</u>** Explain what IRIS is (when CD4 counts<100 cells/µl, a patient has potential for IRIS), common OIs - TB, MAC, CMV and cryptococcal meningitis. 1) When a patient starts ART, their immune system begins to recover and becomes overly active in IRIS. 2) Most cases of IRIS are mild and self-limiting – the immune system will eventually stabilise and adjust to the treatment. 3) Advice to seek immediate medical attention in case of any **new or worsening symptoms.** ***Note: Follow up counselling - reemphasize counselling points on IRIS**	
	Pharmacist's Notes …… ……	
6	**<u>Review any possible drug interactions during each visit</u>** 1) Is the patient taking any other medications 2) Is the patient taking any supplements/traditional medications - To explain to patients regarding risk of drug-drug interactions, to avoid whilst on ART. 3) Not to mix ART into milk for **PRVD**.	
	Pharmacist's Notes …… ……	
7	**<u>Review the patient's tolerability and drug toxicities with each visit (If the patient is already on ART)</u>** 1) Does the patient experience any side effects? 2) How does the patient manage the side effects (if relevant)? 3) Interpret laboratory results related to drug safety profile.	
	Pharmacist's Notes …… ……	
8	**<u>Additional information for PRVD MTAC (when applicable)</u>** Disclosure of RVD status – attain caregiver's consent and need to fill up disclosure date and phase as per Appendix A1 accordingly once the status is disclosed according to the respective phase.	
	Pharmacist's Notes …… ……	

9	**<u>Educate on healthy lifestyle and effects of high risk behaviours</u>** 1) Eat only fully-cooked meals, vegetables, and boiled water – bacteria may be present in raw or undercooked poultry, eggs, or seafood. 2) Maintain good general hygiene and avoid pet faeces (dog/cat etc.). 3) Positive thinking. 4) Discuss the effects of high-risk behaviours, including safe sex practices and avoiding alcohol or drug abuse (e.g. recommend methadone maintenance therapy programme if needed).	
	Pharmacist's Notes ……. …….	

Pharmacist: …… **Date:** ……

PrEP COUNSELLING CHECKLIST

HOSPITAL/HEALTH CLINIC: ……

PATIENT NAME: .....

NO	COUNSELLING CHECKLIST	✔
1	**Review the PrEP regimen** • Regimen: Daily oral PrEP or event-driven PrEP • Past medical history:_____ • Concurrent medications:_____ • OTC/TCM/herbs use:_____ • Baseline eGFR:_____	
2	**Objective of initiating PrEP** • Pre-exposure prophylaxis against HIV • Lowers risk of HIV transmission (74-99%)	
3	**Mechanism of action of PrEP** • Prevent HIV disease transmission • Does not protect against other STI • Advise to have additional preventive methods such as condoms	
4	**Name of PrEP, dose, frequency, and administration/how to take it?** • Tablet Tenofovir disoproxil fumarate/ emtricitabine 200/300mg • Dosing as per daily oral PrEP or oral event-driven PrEP (Table 2 or Figure 1-2) (to show the bottle and colour / shape of the tablet)	
5	**Adherence:** • Importance of adherence • Must be adherent to improve efficacy of prophylaxis. • Any barrier to adherence: _____ • Treatment buddy: _____ • Method to ensure adherence (pill box, reminder in the phone) • Missed dose management for daily PrEP (<12hours, to take as soon as remember, >12 hours, to skip and continue with regular dosing schedule (ref: CDC guideline for PrEP)	
6	**Common side effects and management**: • Headache, diarrhoea, nausea, vomiting (To seek medical assistance when the side effects are prolonged or unbearable) • Drink at least 1.5 - 2 litres of non-caffeinated fluid per day (preferably water) • Avoid protein supplement	

7	**Sign and symptoms of acute HIV infections:** • Fever, sore throat, rash • Prolonged and worsening headache • To seek medical assistance when the sign and symptoms present	
8	**Others:** • To seek advice from healthcare providers before taking any medications/supplements/TCM • To come for all the schedules appointments and monitoring follow-ups • To bring all the remaining tablets and bottle during next appointment	

Pharmacist's Notes

……..

……

……..

……

PEP COUNSELLING CHECKLIST

HOSPITAL/HEALTH CLINIC: ……

PATIENT NAME: .....

NO	COUNSELLING CHECKLIST	✔
1	**Objective of initiating PEP** 8) Post-exposure prophylaxis against HIV	
2	**Name of PEP, dose, frequency, and administration/how to take it?** 9) PEP regimen prescribed:_____ (to show the bottle and colour / shape of the tablet) 10) Administration/how to take it? 11) First dose to be taken immediately (stat). 12) For subsequent doses: To take at the same time every day. 13) Storage: At room temperature and in the original container.	
3	**Adherence:** 14) Importance of adherence 15) Must be adherent to improve efficacy of prophylaxis. 16) Any barrier to adherence: _____ 17) Treatment buddy: _____ 18) Method to ensure adherence (pill box, reminder in the phone) 19) Missed dose: To take as soon as remember	
4	**Common side effects and management**: 20) Headache, diarrhoea, nausea, vomiting 21) Insomnia (with dolutegravir) (To seek medical assistance when the side effects are prolonged or unbearable) 22) Drink at least 1.5 - 2 litres of non-caffeinated fluid per day (preferably water) 23) Avoid protein supplements. 24) Avoid concomitant administration of polyvalent cation-based drugs i.e. Fe^{2+}, Ca^{2+}, Al^{3+}, $Mg^{2,}$ Zn^{2+} (e.g. antacid, iron supplements, multivitamin/mineral). If must be taken, to take dolutegravir at least 2 hours before or 6 hours after administration of the polyvalent cations).	
5	**Sign and symptoms of acute HIV infections:** 25) Fever, sore throat, rash 26) Prolonged and worsening headache 27) To seek medical assistance when the sign and symptoms present	
6	**Others:** 28) To seek advice from healthcare providers before taking any medications/supplements/TCM 29) To come for all the schedules appointments and monitoring follow-ups	

ART GUIDANCE CHART

<table>
<tr><th>Agent</th><th>Recommended Dosage and Side Effects</th><th>Formulation</th><th>Dose Adjustment</th><th>Intake Advice</th></tr>
<tr><td colspan="5">Nucleoside Reverse Transcriptase Inhibitor (NRTI)</td></tr>
<tr>
<td>Lamivudine
(3TC)</td>
<td>Neonate/infant (GA ≥ 34 weeks, PNA < 4 weeks): 2 mg/kg BD
Child:
(GA ≥ 34 weeks, PNA ≥ 4 weeks to < 3 months): 4 mg/kg BD or 8 mg/kg OD
(≥ 3 months): 5 mg/kg BD or 10 mg/kg OD (well tolerated roundup doses)

<table>
<tr><th>Body Weight (kg)</th><th>AM dose</th><th>PM dose</th><th>Total Daily Dose (mg)</th></tr>
<tr><td>14-19</td><td>½ tab(75mg)</td><td>½ tab(75mg)</td><td>150</td></tr>
<tr><td>≥20-24</td><td>½ tab (75mg)</td><td>1 tab (150mg)</td><td>225</td></tr>
<tr><td>≥25</td><td>1 tab (150mg)</td><td>1 tab (150mg)</td><td>300</td></tr>
</table>

Adult: 150 mg BD or 300 mg OD
S/E: Peripheral neuropathy, nausea, diarrhoea, headache, fatigue</td>
<td>Tab: 150 mg
Soln: 10 mg/ml</td>
<td>Paediatric patients: Dose adjustment and/or an increase in the dosing interval should be considered.

For adult patients:
CrCl 30–49mL/min.: 150 mg OD;
CrCl 15–29mL/min.: 150 mg first dose then 100 mg OD or 150 mg OD (depending on available tablet strength);
CrCl <15mL/min.: 150 mg first dose then 50 mg OD or 75 mg OD (depending on available tablet strength);
Hemodialysis.: 50 mg first dose then 25 mg-50 mg OD or 75 mg OD (depending on available tablet strength)</td>
<td>Can be taken with or without food.
Tablets can be crushed and mixed with small amount of water or food.</td>
</tr>
</table>

ART GUIDANCE CHART

Agent	Recommended Dosage and Side Effects	Formulation	Dose Adjustment	Intake Advice
Zidovudine (AZT/ZDV)	**Child:** (< 4 weeks): 4 mg/kg BD Neonate: **GA < 30 weeks:** 2 mg/kg BD (PNA < 4 weeks) 3 mg/kg BD (PNA 4-6 weeks) **GA 30-35 weeks:** 2 mg/kg BD (PNA < 2 weeks) 3 mg/kg BD (PNA 2-6 weeks) **GA ≥ 35 weeks (PNA < 4 weeks):** 4 mg/kg BD Infant born at or near term (**GA ≥ 35 weeks and PNA > 4 weeks**): **Weight based:** 4-8 kg: 12 mg/kg BD ≥9-29 kg: 9 mg/kg BD ≥ 30 kg: 300 mg BD **BSA-based:** 180-240 mg/m^2 BD **Adult:** 300 mg BD **S/E:** anaemia, neutropenia, nausea, headache, myopathy, hepatitis, nail pigmentation, neuropathy, lipodystrophy	**Cap:** 100 mg, 300 mg **Soln:** 10 mg/ml (sugar- free)	CrCl <15mL/min: 300 mg OD Dosage adjustment in severe Haemodialysis: 300 mg OD (to administer after dialysis on a dialysis day) Reduce dose by 50% or double the interval between doses if having impaired hepatic function (Child-Pugh Class C) Discontinue zidovudine if haemoglobin has drop ≥ 25% of baseline or < 8g/dL or when patient develops symptoms of anaemia and/or neutropenia	Can be taken with or without food. Capsules contents can be dispersed in water (sticky/ bitter taste).

ART GUIDANCE CHART

Agent	Recommended Dosage and Side Effects	Formulation	Dose Adjustment	Intake Advice
Tenofovir Alafenamide Fumarate (TAF)	**Child (≥12 years)**: 25 mg OD **Adult:** 25 mg OD **S/E:** Nausea, headache, dizziness, abnormal dreams, diarrhoea, vomiting, abdominal pain, flatulence, rash, fatigue, exacerbation of viral hepatitis on discontinuation, weight gain	**Tab:** 25 mg	CrCl <15mL/min: Not recommended Haemodialysis: 25 mg OD (to administer after dialysis on a dialysis day) Impaired hepatic function (Child-Pugh Class B or C): Not recommended	Take with food Not recommended to be used with rifampicin-containing therapy
Tenofovir Disoproxil Fumarate (TDF)	**Child (≥ 2 years-12 years or ≥ 10kg)**: 8 mg/kg OD **Weight-based:** 17-21kg: 150 mg OD ≥22-27kg: 200 mg OD ≥28-34kg: 250 mg OD ≥35kg: 300 mg OD **Adult (aged ≥ 12 yrs and ≥ 35kg)**: 300 mg OD **S/E**: Headache, nausea, vomiting, renal tubular dysfunction, bone demineralisation, exacerbation of viral hepatitis on discontinuation	**Tab**: 300 mg film-coated tab (equivalent to 245 mg of tenofovir disoproxil)	CrCl 30-49mL/min: 300 mg EOD CrCl 10-29mL/min: 300 mg every 72-94 hourly (if no alternative) CrCl <10mL/min and not on haemodialysis: Not recommended Haemodialysis: 300 mg every 7 day (if no alternative and to administer after dialysis on a dialysis day) Careful monitoring with boosted PI regimens for renal toxicity.	Can be taken with or without food, although absorption is enhanced when administered with a high-fat meal. Tablets can be cut or crushed and dispersed in water, but bitter taste. Orange juice can be used to mask taste.
Tenofovir (TDF) **+ Emtricitabine** (FTC)	**Child** ≥ 35kg: 1 tab OD 17-35 kg: Individual TDF dose Max. dose: As for adults.	**Tab**: TDF 300 mg/ FTC 200 mg	CrCl 30-49mL/min: 300 mg/200 mg (1 tab) EOD CrCl <30mL/min: Not recommended	Can be taken with or without food

	Adult: 1 tab. OD **S/E**: As for TDF. SE for FTC included nausea and diarrhoea, rash, hyperpigmentation/ skin discolouration on palms/soles, predominantly observed in non-Caucasian patients			
Abacavir (ABC)	**Child (aged ≥ 3 months)**: 8 mg/kg BD or 16 mg/kg OD Weight-based: 14-19 kg: 150 mg BD or 300 mg OD ≥20-24kg: 150 mg AM + 300 mg PM, or 450 mg OD ≥25kg: 300 mg BD or 600 mg OD **Adult**: 300 mg BD or 600 mg OD **S/E**: Hypersensitivity reactions, cardiovascular events (myocardial infarction, ischaemic stroke), nausea, fever, headache, diarrhoea, rash, fatigue, respiratory symptoms such as sore throat, cough, short of breath.	**Tab**: 300 mg **Soln**:20 mg/ml	No dose adjustment required for impaired renal function. Impaired hepatic function: Child-Pugh Class A: 200 mg BD (use oral solution) Child-Pugh Class B or C: Contraindicated	Can be taken with or without food. Test patients for the presence of HLA- B*5701 gene before starting therapy to predict risk of hypersensitivity reactions.

ART GUIDANCE CHART

Agent	Recommended Dosage and Side Effects	Formulation	Dose Adjustment	Intake Advice
ZDV + 3TC (Combivir®)	**Child**: 14-20kg: ½ tab BD ≥ 21-30kg: ½ tab AM + 1 tab PM ≥ 30kg: 1 tab BD Individual AZT & 3TC dose BD **Adult**: 1 tab BD	**Tab**: ZDV 300 mg/ 3TC 150 mg	CrCl <50mL/min: Use individual drugs for dose adjustment Impaired hepatic function: Use individual drugs for dose adjustment	Can be taken with or without food. Can be cut or crushed just before giving.
ABC + 3TC (Kivexa®)	**Child**: ≥ 25kg: 1 tab OD Individual ABC & 3TC dose OD **Adult**: 1 tab OD	**Tab**: ABC 600 mg/ 3TC 300 mg	CrCl <50mL/min: Use individual drugs for dose adjustment Impaired hepatic function: Child-Pugh Class A: Use individual drugs for dose adjustment Child-Pugh Class B or C: Contraindicated	Can be taken with or without food. Do not cut or crush.

ART GUIDANCE CHART

Agent	Recommended Dosage and Side Effects	Formulation	Dose Adjustment	Intake Advice
Non-Nucleoside Analogue Reverse Transcriptase Inhibitor (NNRTI)				
Efavirenz (EFV)	**Child (≥ 3 months and body weight ≥3.5kg)**: 3.5-<5 kg: 100 mg ON 5-<7.5 kg: 150 mg ON 7.5-<15 kg: 200 mg ON 15-<20 kg: 250 mg ON 20-<25 kg: 300 mg ON 25-<32.5 kg: 350 mg ON 32.5-<40 kg: 400 mg ON ≥ 40kg: 600 mg ON **Adult (child ≥ 40kg)**: 400 mg ON (with better tolerance) or 600mg ON **S/E**: Neuropsychiatric side effects (hallucination, psychosis, depression, suicidal ideation), dizziness, headache, mood changes, vivid dreams (common but usually short-lived), hypercholesterolaemia, rash.	**Tab**: 200 mg, 600 mg	No dose adjustment required for impaired renal function. Impaired hepatic function: Child-Pugh Class A: Dose adjustment not necessary; use with caution Child-Pugh B or C: Not recommended	Should be taken on an empty stomach, preferably at bedtime. Bioavailability is increased following a high-fat meal.
Nevirapine (NVP)	**Neonate:** **<u>Perinatal transmission, presumptive treatment; high risk</u>** **GA 32 - < 34 weeks:** 2 mg/kg BD (PNA < 2 weeks),4 mg/kg BD (PNA 2-4 weeks), 6 mg/kg BD (PNA 4-6 weeks), 200mg/m^2 BD (PNA> 6 weeks) **GA 34- < 37 weeks:** 4 mg/kg BD (PNA < 1 week), 6 mg/kg BD (PNA 1-4 weeks), 200mg/m^2 BD (PNA > 4 weeks) **GA ≥ 37 weeks:** 6 mg/kg BD (PNA ≤ 4 weeks), 200mg/m^2 BD (PNA > 4 weeks)	**Tab**: 200 mg **Susp**: 10 mg/ml	Discontinue if the patient experiences constitutional symptoms, severe rash or hepatitis. No dose adjustment required for impaired renal function Impaired hepatic function: Child-Pugh Class A: No dose adjustment required Child-Pugh Class B or C: Contraindicated	Can be taken with or without food. Normal release tabs can be cut or dissolved in water.

	<u>Perinatal transmission, prophylaxis; high risk</u> **Birth weight ≤ 2kg:** 8mg for 3 doses (at birth, 48h later and 96h after 2nd dose) **Birth weight > 2kg:** 12mg for 3 doses (at birth, 48h later and 96h after 2nd dose) **Child**: **(<4 weeks)**: 6 mg/kg BD (no lead-in dosing) **(≥4 weeks): Lead in period for 14 days for both weight-based & BSA-based: OD dosing for 14 days, if no rash or no LFT abnormalities after 14 days, then maintenance dose as BD**): Maintenance weight-based: 3-5.9 kg: 50 mg BD 6-9.9 kg: 80 mg BD 10-13.9 kg: 100 mg BD 14-19.9 kg: 130 mg BD 20-24.9 kg: 150 mg BD ≥ 25 kg: 200 mg BD or 400 mg OD Maintenance BSA-based: (≥1 month to < 8 years): 200mg/m^2 BD (≥ 8 years): 120-150 mg/m^2 BD Max. dose: 200mg BD **Adult**: 200 mg OD for 2/52, then 200 mg BD **S/E**: Rash, hepatitis, Stevens-Johnson syndrome – usually within first 6 weeks, can occur up to 18 weeks. Higher risk in ARV-naive females with baseline CD4 >250 cells/uL and males with baseline CD4 >400 cells/uL.			

Rilpivirine (RPV)	**Child (≥ 12 years and ≥ 25kg)**: 25 mg OD **Adult:** 25 mg OD **S/E:** Headache, dizziness, mood changes, depression, sleep disturbance, diarrhoea	**Tab:** 25 mg	No dose adjustment required for impaired renal function Impaired hepatic function: Child-Pugh Class A or B: No dose adjustment required Child-Pugh Class C: No data	Take with food. Do not cut or crush. Avoid PPIs and rifampicin.

ART GUIDANCE CHART

Agent	Recommended Dosage and Side Effects	Formulation	Dose Adjustment	Intake Advice
Protease Inhibitor (PI)				
Atazanavir (ATV)	**Child** **(≥6 years); treatment-naive and treatment experienced:** 15-34 kg: 200 mg OD + Ritonavir 100 mg OD ≥ 35kg: 300 mg OD + Ritonavir 100 mg OD **Adult dose:** 300 mg OD + Ritonavir 100 mg OD **S/E:** Nausea, headaches, rash, jaundice, Indirect hyperbillirubinemia, prolong PR interval, hyperglycaemia, nephrolithiasis	**Cap**: 300 mg	No dose adjustment required for impaired renal function Impaired hepatic function: Child-Pugh Class A: No dose adjustment required Child-Pugh Class B: 300 mg OD (unboosted) for ARV naive patient only Child-Pugh Class C: Not recommended.	Take with food. Do not open capsules. ATV should be paired with ritonavir. All PPIs are contraindicated.

ART GUIDANCE CHART

Agent	Recommended Dosage and Side Effects	Formulation	Dose Adjustment	Intake Advice
Darunavir (DRV)	**Child** **≥3 years with No DRV-resistance mutations (BW ≥10kg):** 10 -<11 kg: DRV 360 mg + RTV 64 mg OD 11 -<12 kg: DRV 400 mg + RTV 64 mg OD 12 -<13 kg: DRV 420 mg + RTV 80 mg OD 13 -<14 kg: DRV 460 mg + RTV 80 mg OD 14 -<15 kg: DRV 500 mg + RTV 96 mg OD 15 -<35 kg: DRV 600 mg + RTV 100 mg OD ≥ 35kg: DRV 800 mg + RTV 100 mg OD **≥3 years with DRV-resistance mutations (BW ≥10kg):** 10-<11 kg: DRV 200 mg + RTV 32 mg BD 11-<12 kg: DRV 220 mg + RTV 32 mg BD 12-<13 kg: DRV 240 mg + RTV 40 mg BD 13-<14 kg: DRV 260 mg + RTV 40 mg BD 14-<15 kg: DRV 280 mg + RTV 48 mg BD 15-<25 kg: DRV 375 mg + RTV 50 mg BD 25-<35 kg: DRV 400 mg + RTV 100 mg BD ≥ 35kg: DRV 600 mg + RTV 100 mg BD **Adult dose:** (ARV-experienced with at least one DRV resistance associated mutations) : DRV 600 mg + Ritonavir 100 mg BD **S/E**: Skin rash, including SJS and erythema multiforme, hepatotoxicity, diarrhoea, nausea, headache, hyperlipidemia, hyperglycaemia	**Tab**: 600 mg	No dose adjustment required for impaired renal function Impaired hepatic function: Child-Pugh Class A or B: No dose adjustment required Child-Pugh Class C: Not recommended	Take with food. DRV should not be used without RTV. DRV contains sulfonamide moiety. Use with caution in patients with known sulfonamide allergy. Tablets can be cut or crushed if necessary.

Lopinavir/ ritonavir (LPV/r)	**Infant** (14 days- 6 months): 300 mg/75 mg LPV/r per m^2 BD or 16 mg/4 mg LPV/r per kg BD **NOT receiving concomitant EFZ, NVP:** **Child** (> 6 months): **Oral Solution:** < 15 kg: 300 mg/75 mg LPV/r per m^2 BD ≥ 15 kg: 230 mg/57.5 mg - 300 mg/75 mg LPV/r per m^2 BD **Based on LPV component:** 7-<15 kg: 12 mg/kg BD 15-40 kg: 10 mg/kg BD >40 kg: 400 mg BD **Oral Tab:** 15-25 kg or ≥ 0.6-<0.9 m^2: 200 mg/50 mg BD >25-35 kg or ≥ 0.9-<1.4 m^2: 300 mg/75 mg BD > 35kg or ≥1.4 m^2: 400 mg/100 mg BD **Co-administered with EFZ, NVP:** **Child** (> 6 months): 300 mg/75 mg LPV/r per m^2 BD **Child and adolescents: Do NOT use once daily.** Max. dose: As for adults **Adult**: 400 mg/100 mg LPV/r BD or 800 mg/200 mg LPV/r OD **S/E**: Hepatotoxicity, diarrhoea, nausea, vomiting, headache, prolong PR interval, hyperlipidemia, hyperglycaemia	**Tab**: 100 mg//25 mg LPV/r 200 mg/50 mg LPV/r **Soln**: 1 ml = 80 mg//20 mg LPV/r	No dose adjustment required for impaired renal function Impaired hepatic function: No dose adjustment recommendation, use with caution	Tabs. can be taken with or without food. Solution should be administered with food. Absorption is increased following a high-fat meal. LPV/r soln. can be kept at room temperature if used within 2 months.

Ritonavir (RTV)	**Child (for boosting other PI's):** <1.3 m^2: 75 mg/m2 BD (up to 100 mg) BD or OD **Adult:** 100 mg BD with Darunavir or 100 mg OD with Atazanavir. **S/E:** Diarrhoea, nausea, vomiting, perioral paresthesias, altered taste sense, flushing, rash, hepatitis, asthenia, hyperlipidemia (especially hypertriglyceridemia), hyperglycemia	**Caps**: 100 mg	Refer recommendation for main PI	Give with or after food. Chocolate milk may help with bitter taste. Do not crush tablets.

ART GUIDANCE CHART

Agent	Recommended Dosage and Side Effects	Formulation	Dosage Adjustment	Intake Advice
Integrase Inhibitor (INSTI)				
Cabotegravir (CAB)	Individuals should be tested for a negative HIV test prior to initiation. This medication is currently approved to be used as pre-exposure prophylaxis (PrEP) in Malaysia. **IM:** Indicated in at-risk adults and adolescents ≥ 35kg for pre-exposure prophylaxis to reduce the risk of sexually acquired HIV infection. **Adult & adolescent ≥ 35kg:** IM: 600 mg monthly x 2 months, then every 2 monthly **Oral:** Indicated in at-risk adults and adolescents ≥ 35kg for short term pre-exposure prophylaxis to reduce the risk of sexually acquired HIV infection — Oral lead-in to assess tolerability of cabotegravir before starting ER IM Injection **Adult & adolescent ≥ 35kg:** PO: 30 mg OD for ~1 month (at least 20 days), following oral lead-in, initiate cabotegravir IM on last day of oral lead-in or within 3 days **S/E:** Hypersensitivity reactions (including, but not limited to, severe rash, or rash accompanied by fever, general	**Injection:** 600 mg/3ml extended release injectable suspension **Tab:** 30 mg	Impaired renal function: **IM:** CrCL ≥60-<90 ml/min: No dosage adjustment required CrCL 15-<30 ml/min or <15 ml/min: Increase monitoring ESRD not on dialysis: Pharmacokinetic effects are unknown Dialysis: Cabotegravir is >99% protein bound; dialysis is not expected to alter systemic exposure **PO:** CrCL ≥30-<90 ml/min: No dosage adjustment required CrCL <15 ml/min: Pharmacokinetic effects are unknown Dialysis: Cabotegravir is >99% protein bound; dialysis is not expected to alter systemic exposure	Tab: Can be taken with or without food Avoid use with rifampicin, rifapentine, phenytoin, phenobarbital, carbamazepine and oxcarbazepine.

	malaise, fatigue, muscle or joint aches, blisters, oral lesions, conjunctivitis, facial oedema, hepatitis, eosinophilia or angioedema), injection site reactions, headache, diarrhoea		Impaired hepatic function: **Child-Pugh Class A or B:** No dosage adjustment required **Child-Pugh Class C:** Pharmacokinetic effects are unknown	
Dolutegravir (DTG)	**Film coated tablets are not bioequivalent to dispersible tablets.** **Dispersible tablet:** **Child (**≥ 4 weeks): 3-5 kg: 5 mg OD 6-9 kg: 15 mg OD 10-13 kg: 20 mg OD 14-19 kg: 25 mg OD ≥20 kg: 30 mg OD **Film coated tablet:** ≥ 20kg: 50 mg OD **Adult:** 50 mg OD **S/E:** Insomia, mood changes, headache, rash, weight gain, hepatotoxicity (higher risk in patient with hepatitis B and C coinfection and liver disease), hyperglycemia, elevated creatine phosphokinase, myopathy, rhabdomyolysis	**Film Coated Tab:** 50 mg (can be cut/ crushed) **Dispersible Tab:** 5 mg	No dose adjustment required for impaired renal function Impaired hepatic function: **Child-Pugh Class A or B:** No dose adjustment required **Child-Pugh Class C:** Not recommended Double dose (50 mg BD) if were to be used with rifampicin-containing regimen, EFZ, NVP, carbamazepine, phenytoin, phenobarbital, St.John's wort	Can be taken with or without food. Preferable to take with food to enhance exposure in the presence of integrase class resistance

ART GUIDANCE CHART

Agent	Recommended Dosage and Side Effects	Formulation	Dose Adjustment	Intake Advice
Fixed Dose Combination				
DTG/3TC (Dovato®)	**Adult and adolescent ≥ 12 years old and ≥ 25 kg**: 1 tab OD	**Tab**: 50 mg DTG/300 mg 3TC	CrCl <50 ml/min: Not recommended Impaired hepatic function: Child-Pugh Class C: Not recommended If recommended DTG dose is 50mg BD, additional dose of 50mg DTG should be taken with 12 hours interval from this fixed dose combination	Can be taken with or without food. Can be cut or crushed.
TDF /3TC/DTG (Teldy®)	**Adult and adolescent ≥ 35 kg**: 1 tab OD	**Tab:** 300 mg TDF/300 mg 3TC/50 mg DTG	CrCl <50 ml/min: Not recommended If recommended DTG dose is 50 mg BD, additional dose of 50mg DTG should be taken with 12 hours interval from this fixed dose combination	Can be taken with or without food
TDF/FTC/EFV (Trustiva®)	**Adult and adolescent ≥ 12 years old and ≥ 40 kg**: 1 tab OD **S/E:** Mood changes, vivid dreams (common but usually short lived), hypercholesterolemia, rash, gynaecomastia	**Tab**: 300 mg TDF/200 mg FTC//600 mg EFV	CrCl <50 ml/min: Not recommended Impaired hepatic function: Child-Pugh Class A: No dosage adjustment required, caution advised Child-Pugh Class B and C: Not recommended	Should be taken on an empty stomach, preferably at bedtime. Do not cut or crush.

Reference: 1. *DRUGDEX* (electronic version). Merative. Retrieved in 2023, from https://www.micromedexsolutions.com.
2. Antiretroviral / HIV Drug Dosing for Children and Adolescents 2022-23 - Imperial College Healthcare NHS Trust

ART–DRUG INTERACTION CHART
NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITOR (NRTI)

Medication	Abacavir (ABC)	Emtricitabine (FTC)	Lamivudine (3TC)	Tenofovir Alafenamide (TAF)	Tenofovir Disoproxil Fumarate (TDF)	Zidovudine (AZT/ZDV)
Acyclovir	*	#	*	X	#	*
Adefovir	*	#	*	X	X	*
Amikacin	*	*	*	#	#	*
Amoxicillin	*	*	*	*	*	*
Amphotericin B	*	*	*	*	*	*
Azithromycin	*	*	*	*	#	*
Ciprofloxacin	*	*	*	*	*	*
Daclatasvir	*	*	*	*	#	*
Dapsone	*	*	*	*	*	*
Fluconazole	*	*	*	*	*	*
Flucytosine	*	*	*	*	*	*
Ganciclovir	X	#	*	#	#	#
Itraconazole	*	*	*	*	#	*
Isoniazid	*	*	*	*	*	*
Oseltamivir	*	*	*	*	*	*
Pentamidine	*	*	#	*	*	*
Penicillins	*	*	*	*	*	*
Pyrimethamine	*	#	#	*	*	*
Ravidasvir	*	*	*	*	*	*
Ribavirin	X	*	*	*	*	X
Rifabutin	*	*	*	X	*	*
Rifampicin	#	*	*	X	*	#

Sofosbuvir	*	*	*	*	*	*
Streptomycin	*	X	*	#	#	*
Trimethoprim/Sulfamethoxazole	*	#	#	*	*	#
Velpatasvir/Sofosbuvir	*	*	*	*	#	*

Note:

X - Should not be co-administered
- Potential interaction (Requires close monitoring, dosing and timing alteration)
* No clinically significant interaction expected

Reference:

1. Liverpool HIV Interactions. https://www.hiv-druginteractions.org/

ART–DRUG INTERACTION CHART

NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS (NRTIS)

Medication	Abacavir (ABC)	Emtricitabine (FTC)	Lamivudine (3TC)	Tenofovir Alafenamide (TAF)	Tenofovir Disoproxil Fumarate (TDF)	Zidovudine (AZT/ZDV)
Antiretrovirals (NNRTI)						
Efavirenz	#	*	*	*	*	*
Nevirapine	#	*	*	*	*	*
Rilpivirine	*	*	*	*	*	*
Antiretrovirals (PI)						
Atazanavir	#	*	*	*	X	*
Darunavir	*	*	*	*	#	*
Lopinavir	#	*	*	*	#	#
Ritonavir	#	*	*	#	#	#
Antiretrovirals (INSTI)						
Cabotegravir	X	X	X	*	*	*
Dolutegravir	*	*	*	*	*	*

Note:

X - Should not be co-administered
- Potential interaction (Requires close monitoring, dosing and timing alteration)
* No clinically significant interaction expected

Reference:

1. Liverpool HIV Interactions. https://www.hiv-druginteractions.org/

ART–DRUG INTERACTION CHART

NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITOR (NNRTI)

Medication	Efavirenz	Nevirapine	Rilpivirine
Anti Infectives			
Acyclovir	*	#	*
Adefovir	*	#	*
Amikacin	*	*	*
Amoxicillin	*	*	*
Artemisinin	#	x	*
Amphotericin B	*	*	*
Caspofungin	#	#	*
Azithromycin	#	*	*
Ciprofloxacin	*	*	*
Clarithromycin	X	X	X
Clavulanic acid	*	*	*
Clindamycin	#	*	*
Daclatasvir	X	X	*
Dapsone	*	*	*
Erythromycin	#	*	X
Fluconazole	#	#	*
Flucytosine	*	*	*
Ganciclovir	*	*	*
Ethambutol	*	*	*
Itraconazole	X	X	#
Isoniazid	*	*	*
Mefloquine	#	*	*
Metronidazole	*	*	*
Moxifloxacin	#	*	#

ART–DRUG INTERACTION CHART

NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS (NNRTIS)

Medication	Efavirenz	Nevirapine	Rilpivirine
Ofloxacin	*	*	*
Oseltamivir	*	*	*
Pentamidine	*	*	*
Penicillins	*	*	*
Primaquine	*	*	*
Pyrimethamine	*	*	*
Pyrazinamide	*	*	*
Quinine	#	#	#
Ravidasvir	*	*	n/a
Ribavirin	*	*	*
Rifabutin	X	#	X
Rifampicin	#	X	X
Sofosbuvir	*	*	*
Streptomycin	*	*	*
Sulfadoxine/ pyrimethamine	*	*	*
Tetracyclines	*	*	*
Trimethoprim/Sulfamethoxazole	*	*	*
Velpatasvir/sofosbuvir	X	X	*
Voriconazole	#	#	#
Antiretrovirals (NRTI)			
Abacavir	*	*	*
Emtricitabine (FTC)	*	*	*
Lamivudine (3TC)	*	*	*
Tenofovir Alafenamide (TAF)	*	*	*
Tenofovir Disoproxil Fumarate (TDF)	*	*	*
Zidovudine (AZT/ZDV)	*	*	*

ART–DRUG INTERACTION CHART

NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS (NNRTIS)

Medication	Efavirenz	Nevirapine	Rilpivirine
Antiretrovirals (PI)			
Atazanavir	#	#	X
Darunavir	#	#	#
Lopinavir	#	#	#
Ritonavir	#	*	#

Note:

X - Should not be co-administered

- Potential interaction (Requires close monitoring, dosing and timing alteration)

* No clinically significant interaction expected

n/a - No data

Reference:

1. Liverpool HIV Interactions. https://www.hiv-druginteractions.org/

ART–DRUG INTERACTION CHART

PROTEASE INHIBITOR (PI)

	Atazanavir	Darunavir	Lopinavir	Ritonavir
Acyclovir	*	*	*	*
Adefovir	*	*	*	*
Amikacin	*	*	*	*
Amoxicillin	*	*	*	*
Artemisinin	#	#	*	#
Amphotericin B	*	*	*	*
Azithromycin	*	#	*	*
Caspofungin	*	*	*	*
Ciprofloxacin	*	*	*	*
Clarithromycin	#	#	#	#
Clavulanic acid	*	*	*	*
Clindamycin	#	#	#	#
Daclatasvir	#	#	#	#
Dapsone	#	*	*	*
Erythromycin	#	#	#	#
Fluconazole	#	*	#	#
Flucytosine	*	*	*	*
Ganciclovir	*	*	*	*
Ethambutol	*	*	*	*
Itraconazole	#	#	#	#
Isoniazid	*	*	*	*

ART–DRUG INTERACTION CHART

PROTEASE INHIBITOR (PI)

	Atazanavir	Darunavir	Lopinavir	Ritonavir
Mefloquine	#	#	#	#
Metronidazole	#	*	*	X
Moxifloxacin	*	*	*	*
Ofloxacin	#	*	*	*
Oseltamivir	*	*	*	*
Pentamidine	*	*	*	*
Penicillins	*	*	*	*
Primaquine	*	*	*	*
Pyrimethamine	*	*	*	#
Pyrazinamide	*	*	*	*
Quinine	#	#	X	X
Ravidasvir	*	*	*	*
Ribavirin	*	*	*	*
Rifabutin	#	#	#	#
Rifampicin	X	X	X	X
Sofosbuvir	*	*	*	*
Streptomycin	*	*	*	*
Sulfadoxine/ pyrimethamine	*	*	*	*
Tetracyclines	*	*	*	*
Trimethoprim/ Sulfamethoxazole	*	*	*	*
Velpatasvir/sofosbuvir	*	*	*	*
Voriconazole	#	#	#	X

ART–DRUG INTERACTION CHART

PROTEASE INHIBITOR (PI)

	Atazanavir	Darunavir	Lopinavir	Ritonavir
Antiretroviral (NRTI)				
Abacavir (ABC)	*	*	*	*
Emtricitabine (FTC)	*	*	*	*
Lamivudine (3TC)	*	*	*	*
Tenofovir Alafenamide (TAF)	*	*	*	#
Tenofovir Disoproxil Fumarate (TDF)	#	#	#	#
Zidovudine (AZT/ ZDV)	*	*	#	#
Antiretroviral (NNRTI)				
Efavirenz	#	#	#	#
Nevirapine	X	#	#	*
Rilpivirine	#	#	#	#
Antiretroviral (INSTI)				
Cabotegravir	*	*	*	X
Dolutegravir	*	*	*	*

Note:

X - Should not be co-administered
- Potential interaction (Requires close monitoring, dosing and timing alteration)
* - No clinically significant interaction expected
n/a - No data

Reference:

1. Liverpool HIV Interactions. https://www.hiv-druginteractions.org/

ART–DRUG INTERACTION CHART

INTEGRASE INHIBITOR (INSTI)

	Cabotegravir	Dolutegravir
Acid reducing agents	Monitor closely. Decrease the level or effect of Cabotegravir	Avoid use or use alternative drug, may decrease the level or effect of Dolutegravir
Daclatasvir	No interactions	No interactions
Metformin	No interactions	Dolutegravir may increase the serum concentration of metformin. Limit total dose of metformin to 1000 mg if coadministration.
Polyvalent cation	Monitor closely. Decrease the level or effect of Cabotegravir	Monitor closely. Decrease the level or effect of Dolutegravir. Administer Dolutegravir at least 2 hour before taking medications containing polyvalent cation.
Ravidasvir	n/a	No interactions
Ribavirin	No interactions	Interaction not studied
Rifampicin	Contraindicated. Increase the level or effect of Cabotegravir	Avoid use or use alternative drug, may decrease the level or effect of Dolutegravir. Increase Dolutegravir dose to 50mg BD
Sofosbuvir	No interactions	No interactions
Velpatasvir/ Sofosbuvir	No interactions	No interactions
Carbamazepine	Contraindicated. Decrease the level or effect of Cabotegravir	Avoid use or use alternative drug, may decrease the level or effect of Dolutegravir
Lamotrigine	Contraindicated. Decrease the level or effect of Cabotegravir.	No interactions
Phenytoin	Contraindicated. Decrease the level or effect of Cabotegravir	Avoid use or use alternative drug, may decrease the level or effect of Dolutegravir

Reference:

1. Liverpool HIV Interactions. https://www.hiv-druginteractions.org/

POTENTIAL METHADONE DRUG INTERACTIONS CHART

Medication	Effect on Methadone	Effect on HIV-Related Medications	Potential Significance/ Recommendation
NRTI			
Zidovudine (AZT/ZDV)	None	May increase AZT AUC 40%	No dose adjustment. Watch for signs/ symptoms of AZT-adverse effects (e.g., headache, muscle aches, fatigue, and irritability).
Lamivudine (3TC)	Unknown	Unknown	No significant change when given as AZT-3TC (Combivir).
Emtricitabine	No clinically significant interaction expected		-
Abacavir (ABC)	May increase methadone clearance by 23%	Decreased abacavir peak concentration by 34%	Monitor for signs/symptoms of withdrawal.
Tenofovir Alafenamide (TAF)	No clinically significant interaction expected		-
Tenofovir disoproxil fumarate (TDF)	No clinically significant interaction expected		-
NNRTI			
Nevirapine	May decrease methadone level by 51%	Unknown	May need to increase methadone dose by ~16%.
Efavirenz	May decrease methadone level by 57%	Unknown	May need to increase methadone dose by ~22% (15-30mg).
Rilpivirine	May decrease methadone level by 57%	Unknown	May need to increase methadone dose by ~22%.
PI			
Atazanavir	Unknown	Unknown	Close monitoring for respiratory depression and sedation. Methadone dose adjustments may be required.
Ritonavir	May decrease methadone AUC by 36%	Unknown	May need to increase methadone dose. Monitor for signs/symptoms of methadone withdrawal.

Medication	Effect on Methadone	Effect on HIV-Related Medications	Potential Significance/ Recommendation
Lopinavir/ Ritonavir (Kaletra)	Unknown, but contains ritonavir so may decrease methadone AUC by 36%	Unknown	May need to increase methadone dose. Monitor for signs/symptoms of methadone withdrawal.
Darunavir	May decrease methadone AUC by 16%; Decreased methadone Cmin by 15%; decreased methadone Cmax by 24%	Unknown	No dose adjustment of methadone is required but patients should be monitored for opiate abstinence syndrome and an increase in methadone dosage may be considered based on clinical response.
INSTI			
Cabotegravir	No clinically significant interaction expected	-	
Dolutegravir	No clinically significant interaction expected	-	

References:

1. Falkner, B., Kosel, B. 2003. Methadone and HIV medications: Drug interactions. *http://www.thebody.com/content/art1822.html?ts=pf*
2. Faragon, J.J., Piliero, P.J. 2003. Drug interactions associated with HAART: Drug interactions among HAART and drugs used in treating addiction. *http://www.medscape.com/viewarticle/461892_4*
3. Pau, A.K., Boyd, S.D. 2010. Recognition and management of significant drug interactions in HIV patients: challenges in using available data to guide therapy. *Clin Pharmacol Ther, 2010. http://www.hiv-druginteractions.org/*
4. 2024 UpToDate
5. Liverpool HIV Interactions. https://www.hiv-druginteractions.org/

ART ADVERSE EFFECTS CHART

A. Nucleoside Reverse Transcriptase Inhibitor (NRTI)

NRTI damages the cellular mitochondria function, which is believed to cause many, if not all, side effects associated. Clinical manifestations of mitochondrial toxicity are lactic acidosis, hepatic steatosis, pancreatitis, peripheral neuropathy, lipoatrophy (fat loss), skeletal myopathy/ cardiomyopathy, and HIV associated neuromuscular weakness.

Table 1: Known and Expected Adverse Drug Events Associated with NRTIs

Drug	Adverse Events
Abacavir (ABC)	• Hypersensitivity syndrome (usually occurs in the first 6 weeks of therapy) which can be characterized by fever, rash, progressive nausea, malaise, diarrhea, respiratory symptoms such as sore throat, cough and shortness of breath. • Nausea, headache • Rare lactic acidosis and hepatic steatosis • Cardiovascular events (MI, ischaemic stroke).
Emtricitabine (FTC)	• Minimal toxicity • Diarrhea, nausea, headache • Hyperpigmentation/skin discoloration of palms and soles
Lamivudine (3TC)	• Minimal toxicity • Severe acute hepatitis flare may occur in HBV co-infected patients • Headache, dry mouth
Tenofovir Alafenamide (TAF)	• Gastrointestinal disorders (diarrhea, vomiting, nausea, abdominal pain, abdominal distension, flatulence) • Fatigue • Headache, dizziness • Decreased bone marrow density (BMD), osteomalacia
Tenofovir Disoproxil Fumarate (TDF)	• Flatulence, abdominal discomfort, headache, nausea, diarrhea, vomiting and flatulence • Asthenia • Acute renal insufficiency, Fanconi syndrome • Severe acute hepatitis exacerbations may occur if TDF is discontinued • Decrease bone mineral density (BMD) particularly of the lumbar spine, osteomalacia
Zidovudine (AZT)	• Bone marrow suppression: Macrocytic anemia (may be seen as early as 2 to 6 weeks after initiation of therapy; avoid initiating AZT in those with Hemoglobin < 9 g/dL) and neutropenia (Usually occurs after 12-24 weeks) • Gastrointestinal intolerance, headache, nausea, asthenia • Hyperpigmentation of skin and nails • Lactic acidosis with hepatic steatosis

B. Non-Nucleoside Reverse Transcriptase Inhibitor (NNRTI)

NNRTIs are associated with hypersensitivity reactions, commonly characterized by skin rash, which usually begins within 1 – 3 weeks of therapy. Rare cases of Stevens - Johnson Syndrome (SJS) have been reported with the use of all four NNRTIs, the highest incidence seen associated with nevirapine use.

Table 2: Known and Expected Adverse Drug Events Associated with NNRTIs

Drugs	Adverse Events
Efavirenz (EFV)	● Low incidence of rash ● Central Nervous System (CNS) symptoms (dizziness, somnolence, insomnia, abnormal dreams, confusion, abnormal thinking, impaired concentration, amnesia, agitation, hallucinations, and euphoria) ● Severity usually decreases within 2 – 4 weeks after initiation of efavirenz ● Elevated liver transaminase levels, hepatotoxicity (rare) ● Dyslipidemia
Nevirapine (NVP)	● 33% incidence of rash, 5% of persons with rash will develop SJS. Usually develops within first 6 weeks of therapy ● Hepatitis Women who start NVP therapy with CD4 cell counts greater than 250 cells/mm^3 (and men with CD4 counts > 400 cells/mm^3) have 12 times greater risk of hepatitis. ● Elevated liver transaminase levels. Hepatotoxicity is more common at higher CD4 cell counts, in women and in patients with hepatitis B or C. ● Dyslipidemia
Rilpivirine	● Endocrine and metabolic hypercholesterolemia, increased LDL cholesterol (14%) ● Increased serum ALT (18%), AST (16%) ● Low incidence of skin rash ● Abdominal distress and pain, nausea and vomiting ● Reduced eGFR due to inhibition of creatinine secretion from proximal renal tubule. ● Abnormal dreams and insomnia, depression, headache, fatigue

C. Protease Inhibitor (PI)

All PIs are associated with lipodystrophy syndrome. Lipodystrophy

is:

- An abnormal fat distribution refers to fat wasting (lipoatrophy) and fat accumulation (lipohypertrophy). Generally, PIs raise the problem of fat accumulation at the abdomen, neck, breasts.
- Metabolic disturbances such as raised triglycerides or cholesterol, impaired glucose tolerance/diabetes.

Table 3: Known and Expected Adverse Drug Events Associated with PIs

Drug	Adverse Events
Atazanavir (ATV)	• Indirect hyperbilirubinemia • Prolonged PR interval – 1st degree symptomatic AV block in some patients • Hyperglycemia • Fat maldistribution, lipodystrophy • Possible increased bleeding episodes in patients with hemophilia • Nephrolithiasis
Darunavir (DRV)	• Skin rash (10%); Stevens-Johnson syndrome and erythema multiforme have been reported • Diarrhea, nausea, headache • Hepatotoxicity • Hyperglycemia • Elevated liver transaminase levels • Hyperlipidemia; Fat maldistribution, lipodystrophy • Possible increased bleeding episodes in patients with hemophilia
Lopinavir/Ritonavir	• GI intolerance, nausea, vomiting, diarrhea (increased in OD than BD dosing) • Asthenia • Hypertriglyceridemia • Elevated liver transaminase levels • Hyperglycemia, insulin resistance • Fat maldistribution • Possible increased bleeding episodes in patients with hemophilia
Ritonavir (RTV)	• GI intolerance, nausea, vomiting, diarrhea • Paresthesias – circumoral and extremities • Hypertriglyceridemia • Hepatitis • Asthenia • Taste perversion • Hyperglycemia • Fat maldistribution • Possible increased bleeding episodes in patients with hemophilia

D. Integrase Inhibitor (INSTI)

Table 4: Known and Expected Adverse Drug Events Associated with Integrase Inhibitors

Drug	Adverse Events
Cabotegravir	• Injection-site reaction; induration (15%), nodules (15%), pain, tenderness and swelling at injection site (>18%), pruritus and erythema • Headache, fatigue, dizziness, sleep disorder • Increased creatine kinase, myalgia • Low incidence of skin rash • Diarrhea, nausea, abdominal pain • Hepatic: increased ALT and AST • Increased serum creatinine • Upper respiratory tract infection, fever
Dolutegravir	• Insomnia, headache • Hyperglycemia • Increased creatine kinase, muscle weakness • Hepatotoxicity: increased ALT and AST • Low incidence of skin rash, pruritus • Neutropenia • Reduced eGFR due to inhibition of creatinine secretion from proximal renal tubule, but no effect on glomerular filtration

References:

1. Adverse Effects of Antiretroviral Agents. Page 28. Guidelines for the Use of Antiretroviral Agents in HIV-1-infected Adults and Adolescents. January 29, 2008.
2. Adverse Effects of Antiretroviral Drugs. Ian R. McNicholl, PharmD. AETC National Resource Center and UCSF Center for HIV Information. July 2009.
3. http://www.hivmanagement.org/arvtable.htm