National HIV Programme: Primary Care Recommendations for People Living with HIV (Version 2, last updated Jan 2026)

ABSTRACT

Background

The proportion of people living with HIV aged above 50 years locally has increased from 18.1% in 2002 to approximately 27% in 2022. Compared to people of similar age without Human Immunodeficiency Virus (HIV) infection, patients living with HIV who are aged 50 years and above are at higher risk of multimorbidity. This risk can be complicated by potential drug toxicities and response to antiretroviral therapy (ART), and lifestyle and social factors despite adherence to ART and viral suppression.

Unfortunately, many healthcare systems globally are not adequately resourced or designed to address these issues. Care for older people living with HIV is often fragmented and not tailored to their unique needs and challenges. In many scenarios, infectious disease physicians are not fully equipped to handle issues associated with ageing, while geriatricians and primary care physicians may not be familiar with the needs of people living with HIV. More research is also required to understand the interaction between HIV and ageing to provide holistic care to these patients. Considering these issues, the Primary Care Recommendations for People Living with HIV infection had been developed to aid infectious diseases physicians, geriatricians and primary care physicians in providing holistic care to older people living with HIV and identify gaps for improvement. The scope of this guidance is for prevention healthcare (including vaccination), age- and risk-factor appropriate health screening, management of co-morbidities in PLHIV. It does not cover diagnosis or treatment of opportunistic infections and only includes diagnosis and treatment of viral hepatitis and STIs but not other community associated infections such as pneumonia.

Methods

Guidelines from the European AIDS Clinical Society (EACS), Infectious Diseases Society of America (IDSA) and the New York State Department of Health AIDS Institute (NYSDOH-AI) representing major international HIV management recommendations were reviewed and adapted for Singapore's context. Local guidelines from the Academy of Singapore (AMS), Agency for Care Effectiveness (ACE0029, Department of STI Control (DSC) and the Handbook on Adult Vaccination in Singapore, National Adult Immunisation Schedule (NAIS) were also referenced for recommendations on cancer screening, co-morbidities management, STI management and vaccinations. An expert committee consisting of specialists from Geriatrics, Endocrinology, Nephrology, Gastroenterology, Psychiatry; a multidisciplinary team of specialist nurses, pharmacists, medical social workers (MSW) and representatives from the National HIV Programme (NHIVP), Enhanced HIV Programmes (EHIVP) and National TB Programme (NTBP) then discussed each recommendation, screened them for conflict of interest and agreed on a consensus suited for the local context. The final document was also reviewed by the Chapter of Infectious Disease Physicians, Family Medicine Chapter and the NHIVP's Community Advisory Board (CAB).

Keywords: Primary Care, HIV

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Executive Summary

Co-morbidities	Assessment/Screening tools	When to Screen and frequency	Additional Comments
Ageing and Geriatrics Syndromes	General approach with focus on: • Frailty → Clinical Frailty Scale • Polypharmacy • Multi-morbidity • Falls • Cognitive impairment → MMSE, AMT and MoCA are available screening tools	• At age 50 years and older • If negative, repeat screen if patient develops multi-morbidity or geriatric syndrome	A holistic approach that is person-centric over a strict methodological adherence to multiple guidelines for each individual disease is preferred. Referral to geriatric and other specialists or allied health professionals including physiotherapists, occupational therapists, dieticians, speech therapists may be required if patients have geriatric syndromes reflecting accelerated ageing.
Renal Health	Renal panel	Every 3-6 months	Avoid nephrotoxic ART e.g. tenofovir disoproxil fumarate (TDF) in patients with risk factors for kidney disease Dolutegravir, bictegravir, rilpivirine, cobicistat and boosted protease inhibitors are associated with an increase in serum creatinine/eGFR reduction (10-15 ml/min or up to 25%) due to inhibition of proximal tubular creatinine transporters without impairment of actual glomerular infiltration
	Urinalysis	Annual	
	Urine albumin/creatinine ratio or urine protein/creatinine ratio	• if abnormal urinalysis • at least annually for patients with existing chronic kidney disease • at least every 6-months for patients with diabetes	
	• Serum bicarbonate and urinary pH • Blood phosphate and urinary phosphate excretion • Blood glucose and glucosuria • Blood uric acid level and urinary uric acid excretion • Serum potassium and urinary potassium excretion	If proximal tubulopathy is suspected for patients on tenofovir disoproxil fumarate	
Bone Metabolism	Dual-energy X-ray absorptiometry (DXA)	• At age 50 years and older • If T-score is normal, rescreening can be done in 3-5 years	For patients on TDF-based regimen who are at risk of osteoporosis or have been diagnosed with osteoporosis, consider switching to another NRTI or consider NRTI-sparing regimen If osteopenia is present, consider the secondary risk factors, and use of the (FRAX™) tool to estimate fracture risk in post- menopausal women and men >

Co-morbidities	Assessment/Screening tools	When to Screen and frequency	Additional Comments
			65 years of age. If the risk for fragility fracture is high, consider referral to an endocrinologist
	Vitamin D	Consider routine screen at age 40 years and older	If vitamin D is < 10 ng/ml, consider doing DXA. Consider Vitamin D supplementation if Vitamin D < 20ng/ml
Cardiovascular Risk Factors			
Hypertension	Bloods pressure monitoring	At least annually or at every physical visit Home BP monitoring should be done for any person ≥ 50 years	The recommended target BP treatment levels are: • < 80 years old: BP < 140/90 mmHg • ⩾ 80 years old: BP < 150/90 mmHg
Diabetes Mellitus	Fasting plasma glucose ≥ 7.0 mmol/l, OR Random plasma glucose ≥ 11.1 mmol/l, OR 2-hour post-oral glucose tolerance test plasma glucose ≥11.1 mmol/l	At initial visit, then annually if normal	HbA1c has been found to underestimate the level of glycaemia in people living with HIV. This is due to several reasons, including macrocytosis (for patients on thymidine analogues) and NRTI (particularly abacavir) use, which affect HbA1c values and underestimates the level of glycaemia Dolutegravir may increase the concentration of metformin. US Prescribing Information suggests limiting the total daily dose of metformin to 1000 mg when starting metformin or dolutegravir
Hyperlipidaemia	Fasting lipid panel	At initial visit, then annually if normal Every 6-12 months if initial screen abnormal	Primary prevention of CAD for patients more than 40 years old • Patients should be offered a statin irrespective of lipid profile or estimated CAD risk; those with an estimated 10-year CAD risk of 5% or greater should be prioritised • Atorvastatin 20 mg daily can be used with titration of dose as necessary For patients less than 40 years old Target LDL cholesterol levels: • Without DM, high-risk of CAD <2.6mmol/L With DM, very high-risk of CAD <1.8 mmol/L When possible, consider switching ART regimens for patients on PI-based regimens

Co-morbidities	Assessment/Screening tools	When to Screen and frequency	Additional Comments
Cardiovascular risk factors	General Lifestyle Intervention	As clinically indicated	150 to 300 minutes per week of moderate-intensity aerobic activity spread out over 5 to 7 days per week should be undertaken Smoking cessation should be strongly encouraged A maximum of 2 standard drinks per day for women and 3 per day for men is recommended Weight reduction through diet modification and exercise is recommended if body mass index > 23 kg/m^2
Liver Diseases and Viral Hepatitis			
HIV-HBV co-infection	Ultrasound hepatobiliary system (US HBS)	Every 6 months	• Tenofovir-containing regimen is preferred ART regimen • For patients with contraindications to tenofovir, entecavir is recommended together with fully active ART
	Alpha-fetoprotein (AFP)	Every 6 months	
	Liver function test (LFT)	• At initiation of antiretroviral therapy (ART) • 1 month after initiation of ART Every 3-6 months after	
	HBV DNA	• At initiation of treatment • Every 3-6 months after initiation of treatment • Annually if undetectable	
	Transient elastography (e.g., FibroScan®)	At baseline upon diagnosis	
HIV-HCV co-infection	US HBS	Every 6 months in patients with HCV-related cirrhosis or F3/bridging fibrosis	Treatment with direct-acting antivirals should be offered and initiated by experienced HIV physician/hepatologist
	AFP	Every 6 months patients with HCV-related cirrhosis or F3/bridging fibrosis	
	LFT	• At initiation of treatment • 4 weeks after initiation of treatment • Every 3-6 months as per routine once normalized	
	HCV RNA	• Baseline • At 12 weeks, 24 weeks and 1 year after treatment cessation	

Co-morbidities	Assessment/Screening tools	When to Screen and frequency	Additional Comments
		• Annually for at risk populations (MSM, PWIDs*)	
	Transient elastography (e.g., FibroScan®)	At initiation of treatment	
	Genotype testing	Prior to initiation of treatment	
Non-Alcoholic Fatty Liver (NAFL)/Non-Alcoholic Steatohepatitis (NASH)			Lifestyle modification and weight reduction should be advised Management of NASH should be in conjunction with an experienced hepatologist
	US HBS	As clinically indicated	Preferred first-line imaging modality
	FIB-4	As clinically indicated	• FIB-4 = Age ([years] x AST [U/L]) / (platelet count [10^9/L] x ALT [U/L]) to determine risk of fibrosis • A FIB-4 score of $\geqslant$ 2.67 has an 80% positive predictive value for advanced fibrosis. However, caution should be used for patients $\leqslant$ 35 years or $\geqslant$ 65 years of age
	Transient elastography (e.g., FibroScan®)	As clinically indicated	Used with FIB-4 to determine risk of fibrosis
Mental Health Screening			
Mental Health	PHQ-2	Baseline, then at least annually	Proceed to PHQ-9 if screen positive
	GAD-2	Baseline, then at least annually	Proceed to GAD-7 if screen positive
			• Medical social worker support to support if mild depression or anxiety • Refer to psychiatrist if moderate/severe depression or anxiety or suicidal or reports history of concomitant substance use
Latent TB Screening			
TB infection (TB) screening	IGRA tests: QuantiFERON-TB Gold Plus test, OR TB T-spot test	Baseline, unless previously tested positive or had documented TB Repeat in patients with initial CD4 < 200 cells/µL and negative IGRA who subsequently immune reconstitute with CD4 > 200 cells/µL on ART	TB disease must be excluded with symptom screening and plain chest radiograph in patients with positive interferon gamma release assay (IGRA)
Cancer Screening			
Breast Cancer	Mammography	Every 2 years for women aged 50-69 years	

Co-morbidities	Assessment/Screening tools	When to Screen and frequency	Additional Comments
Cervical Cancer	Women aged 25-29 years old: Papanicolaou (Pap) smear Women aged 30- 69 years old: HPV testing	At least once every 3 years in women aged 25-29 years At least once every 5 years for women aged 30 years and above	
Colorectal Cancer	• Faecal Immunochemical Test kit-2 specimens on 2 separate days OR, • Faecal Occult Blood Test: 3 specimens on consecutive days OR, • Colonoscopy	<u>At age 50 years and older</u> Annually Annually Once every 10 years	
Hepatocellular Carcinoma (HCC)	US HBS AFP	Every 6 months for patients with chronic hepatitis B infection and liver cirrhosis from other etiologies	The use of both tests is superior to either test alone. AFP should never be used alone to diagnose HCC
Lung Cancer	Individuals aged 50-80 years, with ≥ 20 pack year smoking history, who currently smoke or had quit smoking ≤ 15 years ago. Screening should not be offered to non-smokers. Low dose computer tomography of the thorax	Annual screening for individuals with risk factors as listed	Annual screening should be discontinued once the individual has quit smoking for more than 15 years, becomes medically unfit or unwilling to undergo invasive evaluation or anti-cancer treatment.

Section 1. Introduction

HIV infection remains a global health problem. As of 2022, there were 39 million individuals infected with HIV[1]. The advent of combination antiretroviral therapy (ART) has transformed HIV infection from a hitherto fatal illness into a chronic, but not yet curable disease. ART reduces the mortality attributed to HIV by 80% and reduces the risk of AIDS-related and non-AIDS related death by 50%[2-5]. With increasing access to treatment, more people living with HIV infection are living longer and healthier lives[1]. Consequently, there is a growing number of people aged 50 years and older living with HIV infection in the world today.

The proportion of people living with HIV above the age of 50 years globally has increased from 8% in 2000 to 16% in 2016[6] and is now estimated at 25% in 2023[7]. Likewise, the number of people living with HIV aged above 50 years locally has also increased from 18.1% in 2002 to approximately 26% in 2023[8].

Individuals living with HIV who are aged 50 years and above face a unique set of healthcare issues that are not adequately addressed. Compared to people of similar age without HIV infection, they are at higher risk of multimorbidity. For example, one study predicted that by 2030, 84% of Dutch people living with HIV would suffer from at least one non-communicable disease (NCD)[1] in addition to HIV infection, up from 29% in 2010[9]. Research from high-income countries also shows that people living with HIV may have up to 5 times the risk of NCD even in individuals who have consistently sustained viral suppression[10, 11]. The underlying process for this "accelerated" ageing observed in people living with HIV is postulated to be due to chronic inflammation caused by chronic immune activation[12-15]. This can be complicated by drug toxicities, response to ART, and lifestyle and social factors (e.g. smoking and alcohol use) even with ART and viral suppression[16]. This is worsened in individuals who are non-adherent with their medications (hence with sub-optimal virally suppression), or when they face circumstances such as poverty or food insecurity. Older people living with HIV also face age-related stigma in addition to HIV-related stigma. This results in loneliness, reduced energy and decreased cognitive functioning, which are linked to depression in people living with HIV, particularly among older people [17, 18]. The presence of NCDs, polypharmacy associated with them, and psychosocial stressors, can significantly impact the quality of life in older people living with HIV.

Healthcare systems globally are generally inadequate in addressing these issues[19]. Care for older people living with HIV is often fragmented and not tailored to their unique needs and challenges[20]. Infectious disease physicians are not specialty-trained to handle issues associated with ageing, while geriatricians and primary care physicians may be less attuned to the needs of people living with HIV [21]. More research is also required in understanding the interaction between HIV and ageing in order to provide holistic care to these patients.

In light of these challenges, the Primary Care Recommendations Advisory Group was convened by the National HIV Programme (NHIVP) to create a set of recommendations to aid infectious diseases physicians, geriatricians and primary care physicians in providing holistic care to older people living with HIV and identify gaps that can be further improved. The advisory group consisted of infectious diseases physicians, and sub-specialists with an interest in HIV care, including geriatricians, endocrinologists, hepatologists, psychiatrists and renal physicians, as well as pharmacists, medical social workers and nurses involved in

[1] Noncommunicable diseases include cardiovascular disease (hypertension, hypercholesterolaemia myocardial infarctions and strokes) diabetes, chronic kidney disease, cognitive impairment, osteoporosis and non-AIDS malignancies.

the care of people living with HIV. These recommendations were created using a consensus decision-making process. Building on the first version of Recommendations, it is an updated adaptation of current major international guidelines, including the New York State Department of Health Institute (NYSDOH), the European AIDS Clinical Society (EACS) and the Infectious Diseases Society of America (IDSA)[22-24].

Please note these recommendations are based on clinic and/or public health benefit but may not be subsidised. Kindly refer to the MOH website on which tests/nationally recommended vaccines that are subsidised.

Statement of Intent

The Primary Care Recommendations for PLHIV aim to

a) Guide physicians in providing comprehensive care to people living with HIV in both the HIV specialty and primary care setting
b) Identify gaps in the care of people living with HIV where further research is required
c) Improve the quality of NCD-related care specific to the needs of people living with HIV
d) Improve knowledge of the specific areas of care required when managing NCD in people living with HIV

Intended audience

a) Infectious diseases physicians managing people living with HIV in HIV continuity clinics
b) Other physicians involved in the care of people living with HIV, such as primary care physicians and subspecialists managing co-morbid conditions
c) All nursing and allied health professionals involved in the care of people living with HIV

Section 2: Ageing and Geriatrics Syndromes

S/N	Clinical Consideration	Recommendations
1	Age of screening	• At age 50 years and older[a.] • If initial screening is negative, to rescreen if the patient presents with risks (e.g., multi-morbidity) or any geriatric syndrome.
2	Approach to screening	A general approach should be employed, with a focus on the following domains: • Frailty • Polypharmacy • Multi-morbidity • Falls • Cognitive Impairment Multiple tools exist to screen for deficits in these domains, and their use should be tailored to the specific setting[b].
3	Screening tools	A locally validated screening tool that can be practically employed in the HIV clinic should be used. We recommend the use of the Clinical Frailty Scale (CFS)[c].
4	Approach to polypharmacy	Regular review of medications taken by the patient should be performed either by the prescriber or a pharmacist, together with a medication reconciliation. Wherever possible, medications that pose a greater risk of toxicity in older adults should be avoided (see below) [d].
5	Approach to managing multimorbidity	A holistic approach that is person-centric over a strict methodological adherence to multiple guidelines for each individual disease is preferred. This should be coordinated by a primary physician (who may be a primary care doctor, a HIV specialist or a geriatrician).
6	Approach to fall prevention	When screening for falls, use the falls risk assessment (see below) [e]. If patients are experiencing recurrent falls, appropriate referrals may be required for further evaluation and management.
7	Approach to assessing and managing cognitive impairment	Cognitive assessment may be performed using the following tools in individuals suspected to have cognitive impairment: • MMSE[25, 26] • AMT [26] • MoCA[27] • Consider referring patients to the appropriate specialists for further cognitive evaluation. • Consider HIV-associated neurocognitive disorder as a possible differential in this population. • Multidisciplinary team assessment, support and monitoring of PLHIV with cognitive impairment
8	Indications for referral to geriatrician	Should older adults with HIV present with any of the geriatric syndromes mentioned above, consider if referral to relevant

S/N	Clinical Consideration	Recommendations
		specialists or allied health professionals (e.g., physiotherapists, occupational therapists, dieticians, speech therapists) is required. Referral of patient to the geriatric specialist may be indicated if other specific end-organ deficits are not identified, and patients have geriatric syndromes reflecting accelerated ageing [f]
Abbreviations: HIV, Human Immunodeficiency Virus; CFS, Clinical Frailty Score; MMSE, Mini-Mental State Exam; AMT, Abbreviated Mental Test; MoCA: Montreal Cognitive Assessment		

Notes:

a. Note the variation from the arbitrary threshold of old age or "elderly" as 65 years and older. Most of the literature on human immunodeficiency virus (HIV) infection in older adults defines older as ≥ 50 years of age.

b. The gold standard is the Comprehensive Geriatric Assessment (CGA), which assesses multiple domains of health and function in the older adult, but this may be beyond the scope of the HIV clinic. Consider referral to the geriatric service for CGA if indicated (e.g., frail older adults with geriatric syndromes), where specific interventions may be employed depending on the deficits detected.

c. There is presently no HIV-specific frailty scale, and most extant validated scales did not study individuals with HIV. This means that the tools commonly recommended in guidelines for the general ageing population may not accurately reflect the risk of frailty in older adults with HIV. The recommended frailty screening tools are also mostly studied in older populations (e.g., ≥ 65 years) and, therefore may not accurately detect frailty in younger population (< 65 years). While locally validated screening tools include the CFS, Fried Frailty phenotype and Frailty index, we recommend CFS as it is aligned with the national recommendations for the general population[28-30].

d. Where possible, medications from the following drug classes should be avoided in older adults, as they pose an increased risk of adverse effects[23]:
   - First-generation antihistamines (strong anticholinergic effect)
   - Tricyclic antidepressants (strong anticholinergic effect)
   - Benzodiazepines (increased sensitivity to sedative effects)
   - Atypical antipsychotics (anticholinergic effect)
   - Urologic spasmolytic agents, e.g., oxybutynin (strong anticholinergic effect)
   - Non-steroidal anti-inflammatory drugs (risk of gastrointestinal ulcers/bleeding, renal injury)
   - Digoxin (especially at doses exceeding 0.125mg/day)
   - Long-acting sulphonylureas (risk of hypoglycaemia)

e. In assessing for frequent falls, the following approach may be employed:
   i. Screening question to be asked annually: Have you fallen in the past year?
      - If yes:
        - Ask about symptoms related to/or preceding the fall (particularly postural symptoms such as giddiness, light-headedness or cardiac symptoms such as palpitations).
          - Postural hypotension and cardiac arrhythmia should be excluded.
        - Review the patient's medications, particularly those that may cause anticholinergic toxicities, sedation, orthostatic hypotension, or hypoglycaemia.
        - Perform an assessment of physical function, such as gait, balance, and strength
        - Ask about problems with vision, hearing, cognitive impairment, urinary incontinence, environmental hazards, foot and footwear problems.
        - Consider vitamin D supplementation for vitamin D-deficient older adults
        - Provide education on falls, recommend exercise (e.g., strength and balance training) and consider referral to a physiotherapist and/or occupational therapist.
      - If deficits are present in any of the above, appropriate referral to other specialties may be required to identify underlying causes (e.g., Ophthalmology for visual defects, Neurology for peripheral neuropathy, etc.).

- Consider a comprehensive fall assessment by a healthcare professional with appropriate skills and experience, preferably in a multidisciplinary setting (e.g., Geriatric specialist clinics, falls and balance clinics).

f. If an older adult with HIV present with specific clinical syndromes, they should first be referred to the relevant specialty (e.g., Psychiatry for management of mood disorders, Neurology for neurologic deficits, etc.), with referrals to geriatric specialists based on the respective institutions' referral criteria

Relevant external recommendations

- Thompson MA, Horberg MA, Agwu AL, Colasanti JA, Jain MK, Short WR, et al. Primary Care Guidance for Persons With Human Immunodeficiency Virus: 2020 Update by the HIV Medicine Association of the Infectious Diseases Society of America. Clin Infect Dis [Internet]. 2021 Dec 1;73(11):e3572–605. Available from: https://doi.org/10.1093/cid/ciaa1391
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Section 3: Renal care

Evaluation for CKD

S/N	Clinical Consideration	Recommendations
1	Definition and criteria for CKD	Definition: Abnormalities of kidney structure or function, present > 3 months, with implications on health[a] Criteria: Either one of the following present for > 3 months: 1. Markers of kidney damage – albuminuria > 30 mg/day; urine sediment abnormalities; electrolyte or other abnormalities due to tubular disorder; abnormalities detected by histology; structural abnormalities detected by imaging; history of kidney transplantation, OR 2. Reduced eGFR – eGFR < 60 ml/min/1.73m^2
2	Equation for calculating eGFR	CKD-EPI equation[b] Considers serum creatinine, gender, age and ethnicity
3	Evaluation for kidney disease	1. Renal panel[c] 2. Urinalysis[c] 3. UACR or UPCR: • If abnormal urinalysis • At least annually for individuals with existing CKD • At least 6-monthly for patients with diabetes
4	Management of non-HIV associated CKD: diabetes, hypertension	Refer to the Agency of Care Effectiveness (ACE) Clinical Guidance recommendations on hypertension and diabetes[31, 32].
5	Indication for referral to a nephrologist	• eGFR ≤ 44 mL/min//1.73 m^2 (at least CKD G3B) • Unexplained acute kidney injury or new/unexplained CKD • Rapid kidney function decline of eGFR (> 3-5mL/min per year) or clinically significant decline in eGFR (GFR decline by > 25% from baseline and to a level < 60mL/min/1.73m^2) • New onset or worsening proteinuria (UACR ≥ 300 mg/g per day) • Haematuria combined with either albuminuria and/or proteinuria or increasing blood pressure • Suspected tubulopathies or interstitial nephritis
Abbreviations: CKD, chronic kidney disease; GFR, glomerular filtration rate; CKD-EPI, Chronic Kidney Disease Epidemiology Collaboration; UACR, Urine albumin/creatinine ratio; UPCR, Urine protein/creatinine ratio		

Notes:

a. KDIGO (Kidney Disease Improving Global Outcomes) 2024 Clinical Pactice Guidelines for the evaluation and management of chronic kidney disease. Duration is necessary to distinguish chronic from acute kidney diseases. Practitioners may refer to the KDIGO Guidelines (Table 3) at https://kdigo.org/wp-content/uploads/2024/03/KDIGO-2024-CKD-Guideline.pdf?_sv_p_id=WCHu073RtKZFOOXa[33]. Practitioners can also refer to local recommendations at https://www.ace-hta.gov.sg/healthcare-professionals/ace-clinical-guidances-(acgs)/details/chronic-kidney-disease-early-detection for more information[34]

b. There are various equations for estimation of GFR. The CKD-EPI formula has less bias, better precision and greater accuracy than the Modification of Diet in Renal Disease (MDRD) Study equation [35, 36]. While the GFR-

estimating equation has not been well validated in people living with HIV, the CKD-EPI equation has been demonstrated to be more accurate in people living with HIV in several studies comparing to direct measures of GFR.

c. Practitioners may refer to the Singapore National HIV Recommendation for the use of ART in people living with HIV for timing and frequency of evaluation for kidney disease[37]. More frequent monitoring may be required for patients with additional risk factors for kidney disease or when clinically indicated. These include, but are not limited to family history of end-stage kidney disease; elderly patients; diabetes, hypertension; detectable HIV RNA; hepatitis C coinfection; and use of ART regimens containing tenofovir or atazanavir[38].

Management of HIV-associated Kidney Disease[a]

S/N	Clinical Consideration	Recommendations
1	ART	• Start ART immediately if strong suspicion for HIV-associated nephropathy[b] or HIV immune complex diseases, for instance: proteinuria, unexplained hypertension, abnormalities of urinalysis, otherwise unexplained elevations in creatinine • Avoid nephrotoxic ART in patients with additional risk factors for kidney disease (e.g. tenofovir disoproxil fumarate and tenofovir alafenamide) • Refer to the section below on ART-associated nephrotoxicity for considerations with regards to patients on TDF
2	HIV immune complex kidney disease	• Renal biopsy is recommended for confirmatory histological diagnosis • Consider immunosuppressive therapy
3	ACE inhibitors or angiotensin-II receptor antagonists[c]	• Initiate if presence of hypertension and/or proteinuria • Monitor eGFR and serum potassium levels closely on starting treatment or when modifying dose • Aim for blood pressure target of <130/80 mmHg
4	General measures	• Avoid nephrotoxic drugs • Renally adjust dosages of medications, if necessary • Lifestyle modifications – smoking cessation, weight management, dietary modifications • Manage dyslipidaemia and diabetes

Abbreviations: ART, anti-retroviral therapy; TDF, Tenofovir disoproxil fumarate; HIV, human immunodeficiency virus; GRF, glomerular filtration rate; ACE, angiotensin-converting enzyme

Notes:

a. HIV-associated kidney disease should be managed jointly with a nephrologist. The goal of management is the prevention of progressive renal disease.

b. HIV-associated nephropathy (HIVAN) is characterized by significant proteinuria and progressive kidney failure. It is more prevalent in individuals of African descent and rarely reported in Singapore. ART has been associated with risk reduction for HIVAN as well as longer time to renal replacement therapy in patients with HIVAN[39, 40].

c. ACE inhibition is associated with improved long-term renal survival and reduced risk of renal failure in patients with HIVAN[41, 42].

ART-associated Nephrotoxicity

S/N	Clinical Consideration	Recommendations	
1	Approach to ART selection	Refer to the Singapore National HIV Recommendations for the use of ART in people living with HIV [37]	
2	Approach to evaluation of proximal tubulopathy (for patients on TDF)	Laboratory tests: ▪ Serum bicarbonate and urinary pH ▪ Blood phosphate and urinary phosphate excretion ▪ Blood glucose and glucosuria ▪ Blood uric acid level and urinary uric acid excretion ▪ Serum potassium and urinary potassium excretion For patients suspected to have tubulopathies, referral to a nephrologist is recommended[a]	
	Renal Abnormality	**ARV**	**Management[b]**
3	Proximal tubulopathy[c] with any of the following: 1. Proteinuria 2. Progressive decline in eGFR and eGFR ≤ 90 mL/min 3. Phosphaturia 4. Glucosuria in non-diabetics	TDF	Replace TDF with TAF[d] or non-tenofovir based regimen if any of the following: • Documented tubular proteinuria and/or glucosuria • Progressive decline in eGFR with no other identifiable cause • Hypophosphatemia of renal origin with no other identifiable cause • Osteopenia/osteoporosis in presence of increased urine phosphate leak For patients suspected to have tubulopathies, referral to a nephrologist is recommended
4	Nephrolithiasis with any of the following: 1. Crystalluria 2. Haematuria 3. Leukocyturia 4. Loin pain 5. Acute renal insufficiency	ATV	<u>Assessment</u> • Exclude other causes for nephrolithiasis • Renal tract imaging Consider stopping/switching / ATV if: • Confirmed nephrolithiasis • Recurrent loin pain +/- haematuria
5	Interstitial nephritis with any of the following: 1.Progressive decline in eGFR 2. Tubular proteinuria / haematuria 3. Acute eosinophilia 4. Urinary leukocyte casts	ATV	<u>Assessment</u> • Renal ultrasound Consider stopping ATV if: • Progressive decline in eGFR with no other identifiable cause For patients suspected to have interstitial nephritis, referral to a nephrologist is recommended
6	Progressive decline in eGFR but none of the above	TDF PI/r	<u>Assessment</u> • Evaluate for other risk factors for CKD (see above) • Complete evaluation including tests for proximal renal tubulopathy • UACR, UPCR

S/N	Clinical Consideration	Recommendations	
			• Renal tract imaging Consider referral to a nephrologist and stopping ART with potential nephrotoxicity if no other identifiable cause
Abbreviations: ART, anti-retroviral therapy; TDF, tenofovir disoproxil fumarate; TAF, tenofovir alafenamide; IDV, indinavir; ATV, atazanavir; PI/r, ritonavir-boosted protease inhibitor; CKD, chronic kidney disease; UACR, Urine albumin/creatinine ratio; UPCR, Urine protein/creatinine ratio			

Notes:

a. Referral to a nephrologist is recommended as specialist interpretation of laboratory evaluation may be required.

b. Adapted from the European AIDS Clinical Society (EACS) Guidelines 2023[23]

c. Proximal tubulopathy is characterised by: proteinuria, hypophosphatemia, hypokalemia, hypouricemia, renal acidosis and glucosuria in presence of normal blood glucose level. Most often, only some and not all of these abnormalities are present.

d. TAF is a pro-drug which produces adequate intracellular levels of the active agent, tenofovir diphosphate, at a lower dose than TDF. It has been associated with less nephrotoxicity compared with TDF due to lower plasma tenofovir concentrations. Studies evaluating switch from TDF to TAF suggest potential reversion of nephrotoxicity without adverse impact on virological suppression[43, 44]. However, there is limited data on the use of TAF in patients with low eGFR or on dialysis.

- Dolutegravir (DTG), bictegravir (BIC), rilpivirine (RPV), cobicistat (COBI) and boosted protease inhibitors are associated with an increase in serum creatinine/eGFR reduction (10-15 ml/min or up to 25%) due to inhibition of proximal tubular creatinine transporters without impairment of actual glomerular infiltration

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Section 4: Bone Metabolism

S/N	Clinical Consideration	Recommendation
1	Screening modality	DXA
2	Age of screening	Consider DXA in patients ≥ 50 years old[a]
3	Other risk factors to consider	Consider earlier DXA screening in any person with ≥ 1 risk factor: • Postmenopausal women • High risk for falls • History of low-impact fracture • Clinical hypogonadism • Oral glucocorticoid use (minimum 5 mg/day of prednisone or its equivalent for > 3 months) • Consider TDF use as a potential risk factor. [b]
4	Frequency of screening	• If T-score is normal, rescreening can be done in 3 – 5 years • If patient has any ongoing risk factors (e.g., clinical hypogonadism, ongoing steroid use, prolonged TDF use[b]), consider repeating screen every 2 years
5	Screening for osteomalacia/osteonecrosis	• Consider routine screening of vitamin D in any person ≥ 40 years • If the Vitamin D is < 10 ng/ml, consider doing DXA. Consider Vitamin D supplementation if Vitamin D < 20ng/ml
6	ART-specific intervention	• For individuals on TDF-based regimen who are at risk of osteoporosis or have been diagnosed with osteoporosis, please consider switching to another NRTI or consider NRTI-sparing regimen[c]
7	Indication for referral to an endocrinologist	• Consider referral to an endocrinologist if osteoporosis diagnosed • If osteopenia is present, consider the secondary risk factors, and use of the (FRAX™) tool to estimate fracture risk in post-menopausal women and men >65 years of age. If the risk for fragility fracture is high, consider referral to an endocrinologist.

Abbreviations: DXA, Dual-energy X-ray absorptiometry; TDF, Tenofovir disoproxil fumarate; ART, Antiretroviral therapy; NRTI, nucleoside reverse transcriptase inhibitor

Notes:

a. Several international guidelines and local guidelines for Primary Care suggest the use of WHO Fracture Risk Assessment (FRAX™) tool to estimate fracture risk in post-menopausal women and men >65 years of age. FRAX™ is a useful tool to determine absolute fracture risk. However, the 10-year probability of developing a fracture should be interpreted in light of the patient's circumstances especially in HIV infection. [(45)].

b. TDF has been associated with a decline in BMD, especially when compared to abacavir (ABC)[(46)]. There have also been cases of osteomalacia reported with TDF use[(47, 48)]. The mechanism of bone loss is believed to be related to the development of proximal renal tubulopathy secondary to TDF use, resulting in phosphate loss and progression of osteomalacia[(48)]. However, it is unclear what duration of TDF use is considered significant for osteoporosis risk. Of note, one study from Japan estimates that the cumulative probability of osteoporosis-related fracture increased after ≥ 5 years of TDF exposure[(49)].

There are benefits to improving bone mineral density biomarkers when switching out of a TDF-based regimen. In a randomized, multicentre, open-label study switching patients from TDF- based regimens to TAF-based regimens, improved bone mineral density and renal function were noted among patients who were switched to a TAF-based regimen[50]. For more information on how to switch antiretroviral therapy (ART) regimens, kindly refer to the "**Recommendations for the use of antiretroviral therapy in adults living with HIV in Singapore",** available at: https://www.ncid.sg/About-NCID/OurDepartments/Documents/NHIVP%20ART%20Recommendations%202023_final.pdf [37]

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Section 5. Cardiovascular Risk Factors

Hypertension	
Frequency of monitoring	• At least annually or every physical visit. • If the BP is abnormal, advise patient to monitor BP at home and keep a BP log book[a] • HBPM should be done for any person ≥ 50 years.
Definition of hypertension	Systolic blood pressure: > 139 mmHg, OR Diastolic blood pressure: > 89 mmHg HBPM: Patients with an average BP ≥ 135/85 mmHg measured repeatedly at rest at home may be regarded as hypertensive ABPM: Patients with a 24-hour ABPM average BP ≥ 130/80 mmHg, or a daytime average BP ≥ 135/85 mmHg, or a night-time average BP ≥ 120/70 mmHg are regarded as hypertensive
Blood pressure targets	The recommended target BP treatment levels are[b]: • < 80 years old: BP < 140/90 mmHg • ≥ 80 years old: BP < 150/90 mmHg In fragile elderly patients, the systolic BP goals should be adapted to what the individual can tolerate.
Treatment	Please refer to local clinical practice guidelines(31)
Diabetes Mellitus	
Frequency of screening	All people living with HIV should be screened at initial visit, and annually thereafter if normal.
Type of test	• Fasting plasma glucose ≥ 7.0 mmol/l, OR • Random plasma glucose ≥ 11.1 mmol/l[c], OR • 2-hour post-OGTT plasma glucose ≥11.1 mmol/
Treatment targets	Please refer to local clinical practice guidelines(32)
Treatment	There are drug interactions to consider between metformin and dolutegravir [d]. Please refer to local clinical practice guidelines on appropriate treatment for DM in people living with HIV(32)
Hyperlipidaemia	
Frequency of screening	At initial visit • If initial screen is normal: Annually • If initial screen is abnormal: Every 6 – 12 months
Use of statins for primary prevention of CAD for patients more than 40 years old[e]	• Patients should be offered a statin for primary prevention of CAD irrespective of lipid profile or estimated CAD risk[f] • Patients with an estimated 10-year CAD risk of 5%[g] or greater are prioritised for primary prevention with a statin • Moderate-intensity statin therapy with atorvastatin 20 mg daily can be used as an alternative to pitavastatin • If there are statin-associated side effects, an alternative statin agent or regimen can be considered
Target (Risk stratified) for	People living with HIV without DM: High-risk for CAD • Target LDL cholesterol level: LDL < 2.6 mmol/L

patients less than 40 years old	People living with HIV with DM: Very high-risk for CAD • Target LDL cholesterol level: LDL < 1.8 mmol/L
Treatment	• When possible, consider switching ART regimens for patients on PI-based regimens[h] • Several PIs demonstrate significant drug interactions with certain statins. Please check for drug-drug interactions prior to starting statins in patients on PI-based regimens[i] • Please refer to local practice guidelines on appropriate lipid-lowering therapy[(51)]
General care	
Risk calculator	10-year CAD risk score adapted to local context or the ASCVD calculator[g]
Lifestyle intervention	• Patients who smoke should be advised to stop smoking immediately • Patients who do not currently consume alcohol should not start. For patients who consume alcohol, a maximum of 2 standard drinks per day for women and 3 per day for men is recommended. • If body mass index > 23 kg/m^2, weight reduction through diet modification and exercise is recommended • Persons with dyslipidemia should undertake 150 to 300 minutes per week (~30-60 minutes per day) of moderate-intensity aerobic activity spread out over 5 to 7 days per week • For more information on the ideal nutrition targets for patients with high cholesterol, please refer to the ACE Clinical Guidance (ACG) on Lipids management[(51)]
Indication for referral to an endocrinologist	• For hypertension: consider referring resistant hypertension to an endocrinologist for workup and management[j] • For DM: All patients with DM should have a yearly eye and foot screen[(32)]. Clinics which cannot provide this service should refer patients to centres that do (for instance, polyclinics). Please consider referring patients with uncontrolled DM or Type I DM to an endocrinologist for further management. • For hyperlipidaemia: Please refer any patients suspected of having familial hypercholesterolemia to an endocrinologist for further management. Please refer to the ACG on Lipids management for further information on familial hypercholesterolemia[(51)]
Abbreviations: BP, blood pressure; HBPM, Home BP Monitoring; APBM, Ambulatory BP Monitoring; DM, diabetes mellitus; CAD, Cardiovascular Disease; LDL, low density lipoprotein; ART, antiretroviral therapy; PI, protease inhibitor; CAD, cardiovascular; ASCVD, American college of cardiology atherosclerotic cardiovascular disease	

Notes:

a. Blood pressure (BP) should be monitored twice daily (morning and evening) and adjusted for patients in long-term night shift work. For each BP value in HBPM, at least 2 consecutive measurements are taken, 2 minutes apart and with patients seated. The HBPM is the average of BP values, counting from the second monitoring day[(31)].

b. Certain populations of patients (e.g., type 2 DM, non-diabetic chronic kidney disease patients with moderate albuminuria) have different target BP. For more information, please refer to the ACG on Hypertension, available from: https://www.ace-hta.gov.sg/healthcare-professionals/ace-clinical-guidances-(acgs)/details/hypertension-tailoring-the-management-plan-to-optimise-blood-pressure-control [(31)]

c. In patients with symptoms, either a positive fasting plasma glucose (FPG) or a random plasma glucose is sufficient for diagnosis. In patients without symptoms, a repeat test should be done the following day. FPG is often used as the preferred diagnostic test. However, from local data, the use of FPG ≥7.0 mmol/l alone would result in the classification of 39.1% of subjects with 2-hour post-challenge glucose ≥11.1 mmol/l as non-diabetic. Hence, patients with FPG 6.1 to 6.9 mmol/l should be subject to an oral glucose tolerance test[52]. HbA_{1c} is recently recommended as an alternative screening ~~screening and~~ tool for DM in Singapore[53]. However, HbA_{1c} has been found to underestimate the level of glycaemia in people living with HIV. This is due to a variety of reasons, including macrocytosis (for patients on thymidine analogues) and NRTI (particularly abacavir) use, which affect HbA_{1c} values and underestimates the level of glycaemia[54, 55].
d. Dolutegravir may increase the concentration of metformin[56, 57]. Dose adjustment may be required when starting or stopping dolutegravir with metformin. The US Prescribing Information suggests limiting the total daily dose of metformin to 1000 mg when starting metformin or dolutegravir[58].
e. REPRIEVE is the largest randomised trial performed in people living with HIV aged 40-75 years old. It demonstrated a significant reduction in major adverse cardiovascular events (MACE) in participants randomly assigned to pitavastatin 4 mg daily as compared to those receiving placebo. 7769 participants living with HIV at low– moderate CVD risk (median 10-year risk of 4.5% based on the American Heart Association and American College of Cardiology (AHA/ACC) 2013 Pooled Cohort Equation risk calculator with specific thresholds for LDL-cholesterol) and median baseline LDL-cholesterol of 2.8 mmol/L were randomly assigned to pitavastatin 4 mg daily or placebo. The study was terminated early by the Data Safety and Monitoring Board (DSMB) due to a 35% reduction in MACE after a median of 5.1 years follow-up, an effect that was consistent across major subgroups. Notably, the relative reduction in MACE was greater than the 17% decline predicted by the degree of LDL-cholesterol reduction achieved[59].
f. Women who are planning to conceive should not be started on a statin. Statins should be stopped immediately during pregnancy and should not be restarted until the cessation of breastfeeding, if applicable.
g. There are no calculators adapted to calculate risk of cardiovascular disease (CAD) in people living with HIV. For our local population, we can use the 10-year risk calculator adapted to the local population or the American College of Cardiology's atherosclerotic cardiovascular disease (ASCVD) risk calculator. It should be noted that these calculators are likely to underestimate the CAD risk in people living with HIV. In patients assessed to have intermediate risk by these methods, experts advise that they should be managed as high CAD risk as HIV infection puts people living with HIV at higher CAD risk. HIV-specific cardiovascular risk calculator should ideally be developed in the future for people living with HIV. For more information on the 10-year risk calculator adapted to the local population, please refer to the ACG on Lipids management available at: https://www.ace-hta.gov.sg/healthcare-professionals/ace-clinical-guidances-(acgs)/details/lipid-management-focus-on-cardiovascular-risk.[51]
h. Several protease inhibitors (PI) have been associated with metabolic abnormalities, including dyslipidaemia and insulin resistance. In particular, darunavir/ritonavir and lopinavir/ritonavir-based regimens have been associated with an increased risk of cardiovascular events that is not seen in atazanavir-based regimens.[60] For more information on how to switch antiretroviral therapy (ART) regimens, kindly refer to the 'Recommendations for the use of antiretroviral therapy in adults living with HIV in Singapore' **(**Available at: https://www.ncid.sg/About-NCID/OurDepartments/Documents/ART%20recommendations%20updated%202022.pdf[37])
i. Protease inhibitors are potent CYP 3A4 inhibitors and may have significant drug interactions with statins. In particular, atorvastatin cannot be administered with atazanavir/ritonavir and should only be given up to 10mg with darunavir/ritonavir[61]. Lovastatin and simvastatin are contraindicated in all PIs.[61] For more information on drug-drug interactions involving PI, please refer to section under pharmacy.
j. Resistant hypertension is defined as an average BP sustained at > 140/90 mmHg despite taking 3 antihypertensive agents at optimal tolerated doses, including a diuretic[31]

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Section 6. Liver and Viral Hepatitis

S/N	Clinical Consideration	Recommendations
1	Baseline screening: Type of test	Screening for hepatitis A, B and C: • Anti-HCV[a] • HBsAg, anti-HBc[b], anti-HBs • Anti-HAV IgG Screening of complications in patients with chronic hepatitis viral infection: • Consider a transient elastography (e.g., FibroScan®) at baseline • Referral to Gastroenterology/Hepatology if liver cirrhosis detected
2	HBV and HCV screening frequency for HIV mono-infected	• At initial diagnosis of HIV • New abnormal liver function test – screening for HCV; HBV if non-immune to HBV • Upon diagnosis of new STI for MSM[c] • Annual screening for HCV in MSM and PWID[c]
3	HEV and HDV screening	• If symptoms consistent with acute hepatitis, unexplained flares of aminotransferases, unexplained deranged LFTs or epidemiological risk factors present • HDV screening if HBV infected
4	Indication for referral to Gastroenterology/Hepatology	• Presence of liver cirrhosis[d] • Suspected HCC • Extra-hepatic manifestations of HCV infection
Abbreviations: anti-HCV, anti-hepatitis C virus antibody; HBsAg hepatitis B surface antigen; anti-HBc, anti-hepatitis B core antibody; anti-HBs, anti-hepatitis B surface antibody; anti-HAV, anti-hepatitis A antibody; HBV, hepatitis B virus; HCV, hepatitis C virus; HDV, hepatitis D virus; HEV, hepatitis E virus; STI, sexually transmitted infection; MSM, men who have sex with men; PWID, persons who inject drugs; LFTs, liver function tests; HCC, hepatocellular carcinoma		

Notes:

a. Anti-hepatitis C (HCV) seroconversion occurs 1-6 months after infection. Patients who test positive for anti-HCV should be tested for HCV ribonucleic acid (RNA). If HCV-RNA is positive, initiate treatment in discussion with an experienced HIV physician/hepatologist.

b. Patients who are anti-hepatitis B core (HBc) positive and hepatitis B surface antigen (HBsAg) negative, should be screened for HBV-DNA, especially those with deranged liver transaminases.

c. The highest prevalence of HCV-HIV co-infection was found in persons who inject drugs (PWID) and men who have sex with men (MSM)[(62)]. In a local retrospective cohort study, independent factors associated with HCV co-infection included MSM, intravenous drug use and recent syphilis infection in the last 6 months [(63)].

d. Patients with liver cirrhosis should be referred to a hepatologist for further evaluation, such as endoscopy for oesophageal variceal screening and further management. HIV infection is not a contraindication for liver transplantation. Patients with advanced liver disease should be managed by an experienced HIV physician/transplant hepatologist for the consideration of liver transplantation. Optimal control of HIV is needed for patients undergoing consideration for liver transplantation[(64)].

Treatment and Monitoring of HIV-HBV Co-Infected Patients

Monitoring	
US HBS frequency	Every 6 months for all ages
AFP frequency	Every 6 months for all ages (in conjunction with US HBS)
LFT frequency	• At initiation of ART • 1 month after initiation of ART • 3-6 monthly thereafter
HBV DNA frequency	• At initiation of treatment • 3-6 monthly after initiation of treatment • If undetectable, consider annual monitoring
Treatment[a]	
Type of ART	• Tenofovir (as TDF or TAF) is preferred as a component of ART regimen[b] For patients with contraindications to tenofovir, entecavir is recommended together with fully active ART
Staging of fibrosis	
Transient elastography (e.g., FibroScan®)[c]	• At baseline upon diagnosis • Repeat only if other clinical indications (e.g., other infections, patients not on treatment)
Liver biopsy	Liver biopsy is not recommended at any stage of fibrosis unless requested by a Hepatologist.
Abbreviations: US HBS, hepatobiliary ultrasound; AFP, alpha-fetoprotein; LFT, liver function tests; ART, anti-retroviral therapy; HBV DNA, hepatitis B deoxyribonucleic acid; HBsAg, hepatitis B surface antigen; TDF, tenofovir disoproxil fumarate; TAF, tenofovir alafenamide	

Notes:

a. Early treatment of hepatitis B (HBV) infection in people living with HIV is recommended. HIV/HBV co-infection alters the natural course of hepatitis B. HIV/HBV co-infection accelerates the progress to liver cirrhosis and increases incidence of hepatocellular carcinoma in the presence of cirrhosis[(65)]. The primary goal of HBV treatment in people living with HIV is to prevent liver-related complications by achieving sustained HBV virological suppression.

b. If tenofovir is contraindicated, entecavir can be used as an alternative in patients with no prior lamivudine exposure together with fully active ART. Viral breakthrough has been described in patients with known HBV resistance to lamivudine who have been switched from tenofovir to entecavir. Physicians should note that there is a risk of hepatitis flares with discontinuation or interruption of HBV-active ART.

c. Liver biopsy has been the traditional method for staging of liver fibrosis. However, there are major drawbacks and limitations with liver biopsy, including sampling error, interobserver variability in staging and frequent inadequacy of specimen size. There are also risks involved with invasive biopsy. Transient elastography is a quick, non-invasive alternative modality to stage fibrosis. Several studies demonstrated that transient elastography had good diagnostic performance (high AUROC values) for identifying significant liver fibrosis in patients with chronic hepatitis C or B infection[(66-68)].

Treatment and Monitoring of HIV-HCV Co-Infected Patients

Monitoring	
US HBS frequency	• 6-monthly for HCC screening in patients with HCV-related cirrhosis • Consider 6-monthly for patients with F3/bridging fibrosis[a]
AFP frequency	• 6-monthly for patients with HCV-related F3/bridging fibrosis or cirrhosis (in conjunction with US HBS)

LFT frequency	• At initiation of treatment • At 4 weeks after initiation of treatment • Once normalized, revert to routine frequency as per ART guidelines
HCV RNA frequency	Baseline • At 12 weeks, 24 weeks and 1 year after treatment cessation • Not necessary at completion of treatment • Repeat annually for at-risk populations (MSM, PWIDs)
Screening for complications: type of test	• Extra-hepatic manifestations of hepatitis C infection[b] • Refer to Gastroenterology/Hepatology if cirrhosis is present for additional screening
Treatment	
Genotype testing	Genotype testing is recommended prior to initiation of treatment
Treatment choice	Treatment with DAA should be offered and initiated by experienced HIV physician/hepatologist[c]
Staging for fibrosis	
Transient elastography (e.g., FibroScan®)	At initiation of treatment
Liver biopsy	If clinically indicated (e.g., if concerned for secondary pathology)
Abbreviations: US HBS, hepatobiliary ultrasound; HCV, hepatitis C virus; AFP, alpha-fetoprotein; LFT, liver function tests; ART, anti-retroviral therapy; RNA, Ribonucleic acid; MSM, men who have sex with men; PWID, persons who inject drugs; DAA, direct-acting antivirals	

Notes:

a. The European Association for the Study of the Liver (EASL) recommends extension of 6-monthly US HBS surveillance to patients with chronic hepatitis C (HCV)-related F3/bridging fibrosis[(69)].

b. HCV infection is often associated with extra-hepatic manifestations. These include cryoglobulinemic vasculitis, glomerulonephritis, lymphomas and autoimmune cytopenia.

c. Treatment of HCV in patients with HIV/HCV co-infection must be considered regardless of liver fibrosis stage. Due to drug-drug interactions with ART, HCV treatment should be offered by an experienced HIV physician/HIV hepatologist. The primary goal of HCV treatment is to achieve undetectable HCV-RNA 12 weeks after the end of therapy (SVR_{12}).

Non-Alcoholic Fatty Liver (NAFL)/Non-Alcoholic Steatohepatitis (NASH)[a]

Diagnosis	Ultrasound as preferred first-line imaging modality
Determine the risk of fibrosis	• FIB-4[b] • ± transient elastography (e.g., FibroScan®)[c]
Treatment	• Lifestyle modification and weight reduction • Management of NASH should be in conjunction with an experienced hepatologist
Indication for referral to Gastroenterology/Hepatology	• Presence of advanced fibrosis or liver cirrhosis • HCC suspected

Notes:

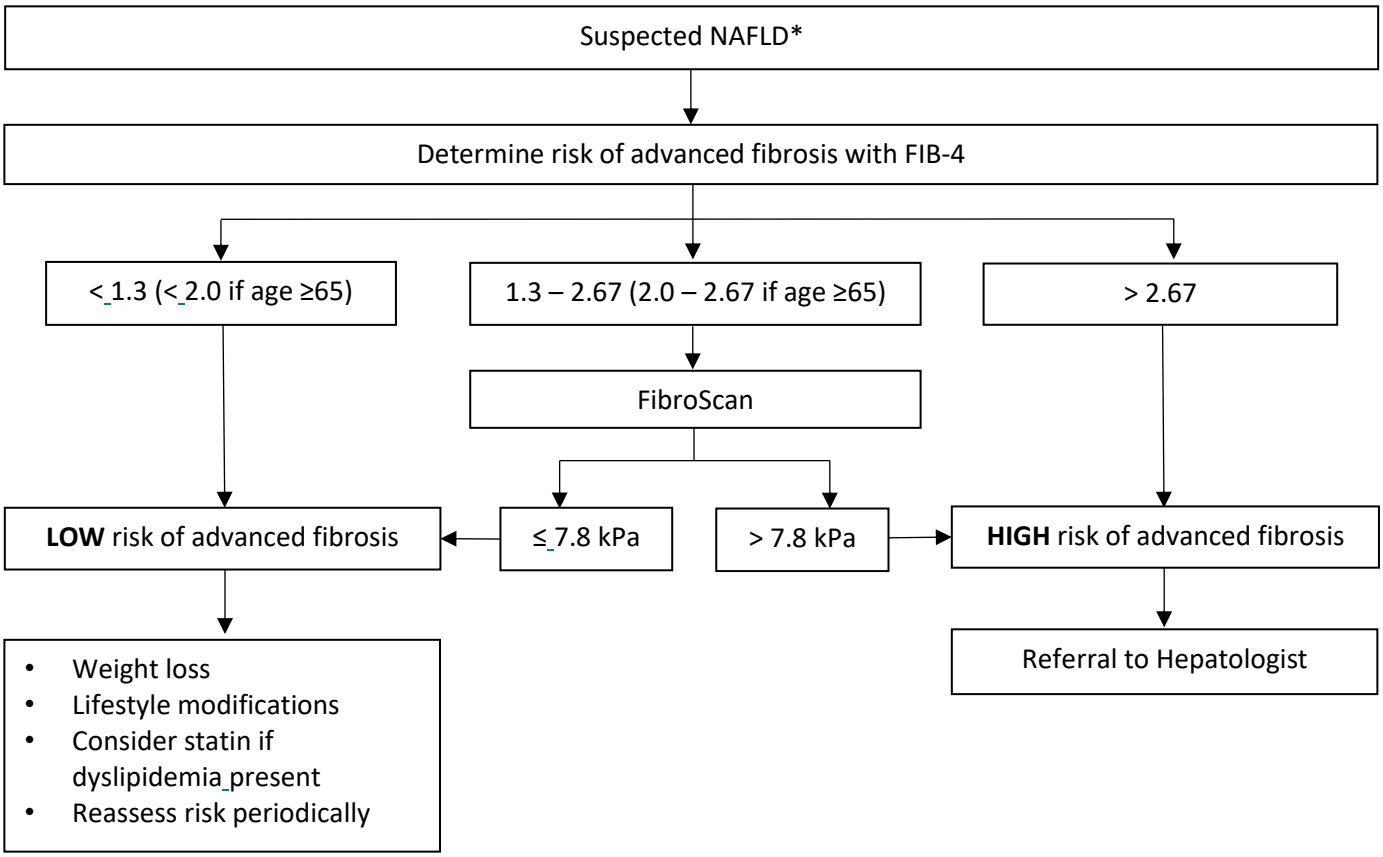
a. The prevalence of NAFLD is higher in people living with HIV compared with the general population. Those at risk include patients with metabolic syndrome (obesity, type 2 diabetes, dyslipidemia or hypertension) and persistently elevated alanine transaminase (ALT) levels without other identifiable cause.

b. FIB-4 = Age ([years] x AST [U/L]) / (platelet count [10^9/L] x ALT [U/L])[(70)]. The FIB-4 score demonstrated better diagnostic performance compared to other non-invasive biomarkers of fibrosis in patients with NAFLD. A FIB-

4 score of ≥ 2.67 has an 80% positive predictive value for advanced fibrosis[71]. However, caution should be used for patients ≤ 35 years or ≥ 65 years of age.

c. For patients with an intermediate FIB-4 score, transient elastography should be considered. Patients who have advanced fibrosis identified should be referred to an experienced hepatologist.

Algorithm for the use of FIB-4



* Screening for cardiovascular risk factors with aggressive management if present, is recommended for all patients with NAFLD.

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Section 7. Mental Health Screening

S/N	Clinical Consideration	Recommendations
1	Population to screen	All patients at baseline[a]
2	Screening tools for depression[b]	• PHQ-2 • Proceed to full scale (PHQ-9) if screen positive
3	Screening tools for anxiety[c]	• GAD-2 • Proceed to full scale (GAD-7) if screen positive
4	Frequency of screening	Baseline, then at least annually
5	Management strategies	Risk stratification[d]: • Mild depression/anxiety → MSW and clinical psychologists to support • Moderate/severe depression or anxiety or suicidal → Refer to psychiatrist

6	Approach to substance use	Screening for all patients at baseline (substance use including tobacco)
		If screen positive:
		• Tobacco → refer to smoking cessation programme
		• Substance use[e]:
		  ○ No depression/anxiety → consider referring to NAMS or peer support groups
		  ○ Refer to psychiatrist if there is comorbid anxiety/depression

7	Indications for referral to psychiatrist	• Moderate/severe depression or anxiety or suicidal • Substance use with comorbid anxiety and depression
Abbreviations: PHQ, Patient Health Questionnaire; GAD, Generalised Anxiety Disorder scale; MSW, medical social worker; NAMS, National Addictions Management Service		

Notes:

a. Due to the high prevalence of depression and associated anxiety in people living with HIV[72, 73], screening is recommended for all patients at baseline. Depression and anxiety are also associated with increase in morbidity and mortality in people living with HIV and adversely affects adherence[74].

b. Screening with the patient health questionnaire (PHQ)-2 questionnaire is recommended as a quick screening tool for major depressive disorder, incorporating the first two questions of the PHQ-9. It is physician-administered with a sensitivity of 91% and specificity of 67% using a cut-off score of >2. Combination of PHQ-2 followed by PHQ-9 has a sensitivity of 82% and specificity of 87%[75]. Patients who screen positive on the PHQ-2 should be further evaluated with the PHQ-9 to determine if they meet the criteria for a depressive disorder. PHQ-2: https://www.hiv.uw.edu/page/mental-health-screening/phq-2; PHQ-9: https://www.hiv.uw.edu/page/mental-health-screening/phq-9. These screening tools can also be found in the **Annex A**

c. Screening with the generalised anxiety disorder (GAD)-2 questionnaire is recommended as a quick screening tool for anxiety disorder, incorporating the first two questions of the GAD-7. It is a patient-reported scale with a sensitivity of 65% and specificity of 88% for identifying any anxiety disorder. The GAD-7 has a sensitivity of 89% and specificity of 82%[76]. Patients who screen positive on the GAD-2 should be further evaluated with the GAD-7 to determine if they meet the criteria for an anxiety disorder. Of note, this may miss panic disorders.
GAD-2: https://www.hiv.uw.edu/page/mental-health-screening/gad-2;
GAD-7: https://www.hiv.uw.edu/page/mental-health-screening/gad-7

d. Based on the scores on each scale (PHQ-9 and GAD-7), patients with depression or anxiety disorder can be risk stratified to mild, moderate or severe. It is recommended that patients with mild depression/anxiety be

referred to MSW for psychosocial counselling and support. Patients with moderate/severe depression/anxiety or suicidal risk should be referred to a psychiatrist for further evaluation and management.

The Hospital Anxiety and Depression Scale (HADS) is a self-reported questionnaire consisting of seven items each for depression and anxiety. It includes items that identify panic symptoms, compared to the GAD-7. It has a sensitivity of 90% and specificity of 78% for anxiety, as well as a sensitivity of 83% and specificity of 79% for depression[77]. However, it was designed for the hospital setting. As such, the PHQ-2 and GAD-2 are recommended for rapid screening in the outpatient setting.

e. Physicians should be aware there are legal implications for patients reporting illicit drug use when screening.

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Section 8. TB infection Screening

Screening

S/N	Clinical Consideration	Recommendation
1	Screening test of choice	IGRA test, either: • QuantiFERON-TB Gold Plus test, OR • TB T-spot test[a,b]
2	Tuberculin Skin Test (TST)	Not recommended[a]
3	Who to screen	Everyone at baseline, unless previously tested positive or had documented TB
4	Frequency of screening	▪ Upon initiation of care ▪ Repeat testing is recommended in patients with initial CD4 < 200 cells/µL and negative IGRA who subsequently undergo immune reconstitution with CD4 > 200 cells/µL on ART
5	Indication to treat	Positive IGRA[c]
Abbreviations: IGRA, Interferon Gamma Release Assay; TB, tuberculosis; ART, anti-retroviral therapy		

Notes:

a. Tuberculin skin test (TST) is not recommended due to the difficulty in interpreting the results. Besides false positive reactions in the BCG-vaccinated population, there can be false negative results in people living with HIV, especially in patients whose CD4 counts are less than 200 cells/µL. There are no major studies evaluating the validity of TST in people living with HIV who are also BCG-vaccinated.

b. TB T-spot test is currently not available in some laboratories.

c. Active tuberculosis (TB) must be excluded with symptom screening and plain chest radiograph in patients with positive interferon gamma release assay (IGRA). We recommend sputum acid fast bacilli (AFB) studies in patients with compatible symptoms and/or abnormal chest radiographs.

Treatment

Regimen	Comments
Recommended: Rifampicin 600mg OD (4R)[a]	• Duration: 4 months • Consider drug-drug interactions with ART
Recommended: Isoniazid 5mg/kg (max 300mg) OD + pyridoxine 10-50mg (6H or 9H)	• Duration: 6 months; 9 months for pregnant/breastfeeding women
Rifapentine 900mg once/week + Isoniazid 900mg once/week (3HP)[b]	• Duration: 3 months • Must be given under DOT • Limited by cost and availability • Safety during pregnancy not studied
Rifapentine 10mg/kg + Isoniazid 5mg/kg daily (1HP)	• Duration: 1 month • Limited by cost and availability • Data evaluated participants in high TB burden settings • Can be used as alternative to above regimens
Abbreviations: OD, once daily; 6H, 6 months of isoniazid; 9H, 9 months of isoniazid; 4R, 4 months of rifampicin; ART, anti-retroviral therapy; 3HP, 3 months of weekly rifapentine and isoniazid; 1HP, 1 month of daily rifapentine and isoniazid DOT, directly observed therapy	

The above tables are adapted from the Singapore tuberculosis (TB) clinical management guidelines 2024: A modified Delphi adaptation of international guidelines for drug-susceptible TB infection and pulmonary disease, available from: https://annals.edu.sg/singapore-tuberculosis-clinical-management-guidelines-2024/[78]

Notes:

a. Rifampicin is associated with many drug-drug interactions with ARTs (Physicians may refer to www.hiv-druginteractions.org for list of potential drug-drug interactions). 4 months of rifampicin (4R) can be considered in patients with underlying liver disease or with other risk factors for hepatotoxicity associated with isoniazid (e.g., other concomitant hepatotoxic medications).

b. There was no significant difference in outcomes with 3 months of isoniazid and rifapentine (3HP) compared with either 6 or 9 months of isoniazid (6H/9H) in HIV-positive patients[79, 80]. A one-month regimen of daily rifapentine with isoniazid was also found to be non-inferior to 9H in HIV-infected patients[81]. While 3HP is recommended as a preferred regimen in the 2020 CDC guidelines for the treatment of TB infection[82], rifapentine is not yet widely available in public institutions in Singapore. As such, we recommend 6H or 9H as the preferred regimen for treatment of TB infection.

   - Patients on treatment for TB should be monitored for hepatotoxicity. ALT and AST should be done at least at baseline and at the one-month review visit. If there are no abnormalities or other indications, there is no need to repeat ALT and AST testing[78].

     - For patients at high risk for hepatotoxicity, we recommend checking ALT and AST at a shorter interval of 2 weeks after initiation of treatment (if no abnormalities, ALT and AST can be monitored once a month thereafter). These patients include elderly patients >60 years old; hepatitis B and C carriers; patients with chronic liver disease or chronic alcoholism; patients on concomitant potentially hepatotoxic medications (e.g., statins); and those with elevated baseline ALT/AST[78].
     - Repeat laboratory testing is also recommended whenever patients show symptoms/signs suggestive of hepatitis. These include fever, anorexia, nausea/vomiting, right upper quadrant abdominal discomfort and jaundice.

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Section 9. STI Management

General Management

Holistic management of a diagnosed sexually transmitted infection should include:

1. Evaluation for other sexually transmitted infections.

Investigation	Comments
Chlamydia/Gonorrhea Screen (Nucleic Acid Amplification Test)	Consider swab sites: urine, vaginal; ano-rectal; oropharyngeal
Hepatitis B and C	Anti-HBs, HBsAg, anti HCV
Syphilis	RPR, Syphilis IgG
Genital Herpes	Swab sores for herpes simplex virus PCR
Abbreviation: Anti-HBs, anti-hepatitis B surface antibody; HBsAg, Hepatitis B surface antigen; anti-HCV, anti-hepatitis C antibody; RPR, rapid plasma reagin	

2. Risk assessment: **P**artners, **P**ractices, **P**rotection, **P**ast history of STIs, **P**regnancy intent
3. Education and counselling: change in sexual behaviours and use of prevention methods, e.g., pre-exposure vaccinations, pre-exposure prophylaxis, condoms, contraception methods, etc
4. Partner counselling, screening and treatment
5. Report to health authorities via Communicable Diseases Live and Enhanced (CDLENS) portal if applicable. Please refer here for the list of infectious diseases that are legally notifiable under the Infectious Diseases Act

Genital Herpes

Prescription		Comments
First Episode		
#1	Acyclovir PO 400mg TDS x 7 to 10 days	Renal dose adjustment required
ALT	Valacyclovir PO 1000mg BD x 7 to 10 days	Renal dose adjustment required
Recurrent Episodes		
#1	Acyclovir PO 400mg TDS x 5 days Acyclovir PO 800mg TDS x 2 days	Renal dose adjustment required
ALT	Valacyclovir PO 500mg BD x 3 days Valacyclovir PO 1000mg OD x 5 days	Renal dose adjustment required
Chronic suppressive therapy		
#1	Acyclovir PO 400mg BD Valacyclovir PO 1000mg OD	• Renal dose adjustment required • Usually offered to persons who experience ≥6 clinical episodes per year or who experience significant anxiety or distress related to their clinical recurrences
Abbreviations: #1, primary regimen; ALT, alternate regimen; PO, by mouth		

Syphilis

Prescription		Comments
Primary, Secondary, Early Latent		
#1	Benzathine Penicillin IM 2.4MU once	• Provide advice on Jarisch-Herxheimer reaction

Prescription		Comments
		• Recommend desensitization if allergic. • ALT regimens are not recommended for pregnancy in all stages of syphilis*
ALT	Doxycycline PO 100mg BD x **14 days**	Advise on gastrointestinal side effects.
ALT	Ceftriaxone IM/IV 1g OD x 10 days	May be given at OPAT
ALT	Azithromycin PO 2g once	• Not recommended unless no other alternative options present • Not for MSM and pregnant patients
Late Latent		
#1	Benzathine Penicillin IM 2.4MU weekly x 3 doses	• Recommend desensitization if allergic • ALT regimens are not recommended for pregnancy in all stages of syphilis*
ALT	Doxycycline PO 100mg BD x **28 days**	Advise on gastrointestinal side effects
Neurosyphilis, Ocular, Otic		
#1	Aqueous crystalline penicillin G IV (daily via continuous infusion) 18 to 24 MU x 14 days Aqueous crystalline penicillin G IV 3 to 4 MU every 4H x 14 days	• Recommend desensitization if allergic • Continuous infusion may be given at OPAT • Consider Benzathine Penicillin IM 2.4MU weekly x 1 to 3 doses after completion • ALT regimens are not recommended for pregnancy in all stages of syphilis*
ALT	Procaine penicillin G IM 2.4MU OD + Probenecid PO 500mg 6H x 10 to 14 days	• Do not give Probenecid to patients allergic to sulfa-containing medications • Consider Benzathine Penicillin IM 2.4MU weekly x 1 to 3 doses after completion
ALT	Ceftriaxone IM/IV 1 to 2g OD x 10 to 14 days	May be given at OPAT
Tertiary with Normal CSF Examination		
#1	Benzathine Penicillin IM 2.4MU weekly x 3 doses	• Recommend desensitization if allergic • ALT regimens are not recommended for pregnancy in all stages of syphilis*
*For patients who are pregnant with immediate type allergic reactions to penicillin, please refer to allergist for penicillin skin testing and desensitization if allergy is proven.		
Abbreviations: #1, primary regimen; ALT, alternate regimen; PO, by mouth; IM, intramuscular; IV, intravenous; BD, twice daily; OD, once daily; OPAT, outpatient antibiotics therapy; MSM, men who have sex with men; MU, million I.U; CSF, cerebrospinal fluid		

Chlamydia

Prescription		Comments
Uncomplicated Genital Infections (including urethritis; ♀cervicitis)		
#1	Doxycycline PO 100mg BD x 7 days	Advise on gastrointestinal side effects.
ALT	Azithromycin PO 1g once	
ALT	Levofloxacin PO 500mg OD x 7 days	
Extragenital Infections (proctitis, epididymitis, pelvic inflammatory disease, oropharyngeal)		
#1	Doxycycline PO 100mg BD x 7 days + Ceftriaxone IM 500mg once	Advise on gastrointestinal side effects.

Prescription		Comments
	**Ceftriaxone IM 1g once for persons weight > 150kg*	• May omit ceftriaxone if negative for gonorrhea in asymptomatic rectal and oropharyngeal Chlamydial infections • For pelvic inflammatory disease, consider addition of metronidazole for anaerobic cover and refer gynaecologist • For symptomatic proctitis, it is reasonable to consider 3 weeks course of doxycycline for presumptive lymphogranuloma venereum • Advise abstinence for at least 1 week
ALT	Azithromycin PO 1g once	
ALT	Levofloxacin PO 500mg OD x 7 days	
Lymphogranuloma venereum		
#1	Doxycycline PO 100mg BD x 21 days	• Advise on gastrointestinal side effects • Advise abstinence for at least 1 week
Chlamydial Infection in Pregnancy		
#1	Azithromycin PO 1g once	Benefits outweigh risk even in first trimester
ALT	Amoxicillin PO 500mg TDS x 7 days	
Abbreviations: #1, primary regimen; ALT, alternate regimen; PO, by mouth; IM, intramuscular; BD, twice daily; OD, once daily; TDS, three times a day		

Gonorrhea

Prescription		Comments
Uncomplicated Infections (pharyngitis, proctitis, urethritis; ♀cervicitis)		
#1	Ceftriaxone IM 500mg once + (Doxycycline PO 100mg BD x 7 days)[b] **Ceftriaxone IM 1g once for persons weight > 150kg*	Give Doxycycline if Chlamydia has not been excluded
ALT	Azithromycin PO 2g once + Gentamicin IM 240mg once + (Doxycycline PO 100mg BD x 7 days)	Only used if severe cephalosporin allergy Give Doxycycline if Chlamydia has not been excluded
Conjunctivitis		
#1	Ceftriaxone IM 1g once	Urgent ophthalmology review Consider lavage of infected eye
Disseminated Infection		
#1	Ceftriaxone IM/IV 1g OD	Admit patient
Abbreviations: #1, primary regimen; ALT, alternate regimen; PO, by mouth; IM, intramuscular; BD, twice daily; OD, once daily;		

- The above tables are adapted from the STI Management Standard Clinical Practice Guidelines 7th Edition, available from: https://www.nsc.com.sg/dsc/healthcare-professionals/publications/Pages/STI-Management-Guidelines.aspx[(83)].

Notes:

a. While WHO guidelines have recommended IM Ceftriaxone 1g for the treatment of gonorrhea (genital, anorectal and/or oropharyngeal), most other international guidelines (e.g USA, Australia) have not increased the

recommended dosage from 500mg. As local resistance rates are low, the workgroup has elected to keep the dose of IM Ceftriaxone at 500mg for now. There are zero cases of laboratory resistant strains from 2020 to 2022, and only 3 cases (1.09% of samples tested) in 2023 (unpublished data from the National STI Surveillance Programme). All 3 cases had clinical resolution despite in vitro resistance. The workgroup will continue to monitor the local resistance rate closely and update the treatment guidelines as necessary.

References

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Section 10. Cancer Screening

Breast Cancer	
Age of screening	Women aged 50 - 69 years
Type of screening	Mammography
Frequency of screening	Once every 2 years
Cervical Cancer	
Age of screening	• General population: Women aged 25 - 69 years • Women with HIV may be screened earlier
Type of screening	• Women aged 25-29 years: Pap smear • Women aged 30 years and above: HPV testing
Frequency of screening	• Women aged 25-29 years: at least once every 3 years • Women aged 30 years and above: at least once every 5 years
Colorectal Cancer	
Age of screening	• Average-risk patients: 50 years old • Increased-risk patients: Refer to the Academy of Medicine Report of screening test review committee for more information[a]
Type and Frequency of screening	**FIT kit**: 2 specimens on 2 separate days annually **Faecal Occult Blood Test**: 3 specimens on consecutive days annually **Colonoscopy[b]**: Once every 10 years
Hepatocellular Carcinoma	
Population to be screened	Patients with chronic hepatitis B infection and liver cirrhosis from other aetiologies are at increased risk of developing HCC, and surveillance should be offered to these at-risk patients with the aim of detecting HCC. There is no data to support HCC screening in the general population.
Type of screening	1. AFP 2. Ultrasound of the Hepatobiliary System The use of both tests is superior to either test alone[c]. AFP should never be used alone to diagnose HCC.
Frequency of screening	**High-risk groups**: 6-monthly[c] **Other groups**: Annually
Prostate Cancer	
Population to be screened	• Men who are between 50 to 70 years of age, with an estimated life expectancy of more than 10 years • High-risk men, such as men with a strong family history of prostate cancer[c]
Type of screening	Prostate-Specific Antigen (PSA)
Frequency of screening	Frequency of screening is unclear. Due to uncertainty that PSA testing results in more benefit than harm, the decision to use PSA for early

	detection of prostate cancer should be individualised. Individuals need to be informed of the risks and benefits of testing before it is undertaken.
Lung Cancer	
Population to be screened	• Individuals aged 50-80 years, with more than 20 pack year smoking history, who currently smoke or had quit smoking 15 years ago or less. • Screening should not be offered to non-smokers
Type of screening	Low dose computer tomography of the thorax
Frequency of screening	Annual screening[d] for individuals with the risk factors as listed
Abbreviations: Pap smear, Papanicolaou smear; MOH, Ministry of Health; FIT, Faecal Immunochemical Test; HCC, hepatocellular carcinoma; AFP, Alpha-Fetoprotein	

Notes:

a. Patients who are at increased risk of colorectal cancer includes those who have one or more first degree relatives with colorectal cancer or a personal history of colorectal neoplasia. Patients who have prior endometrial, ovarian or breast cancer and those who have had pelvic radiation may have a slightly higher than average risk of colorectal cancer. Patients with hereditary or genetic predisposition for colorectal cancer e.g. familiar adenomatosis polyposis or other hereditary syndromes, long history of extensive inflammatory bowel disease are considered to be high risk for colorectal cancer. For more information on the appropriate age to start screening high-risk patients, please refer to the Academy of Medicine report of screening test review committee[(84)].Available from: https://www.ams.edu.sg/viewpdf.aspx?file=media%5c4817_fi_59.pdf&ofile=STRC+Report+March+2019.pdf
b. Patients at increased or high risk of colorectal cancer should be screened via flexible sigmoidoscopy or colonoscopy. Please refer to the Academy of Medicine report of screening test review committee for more information[(84)]. Available from: https://www.ams.edu.sg/viewpdf.aspx?file=media%5c4817_fi_59.pdf&ofile=STRC+Report+March+2019.pdf
c. For more information on which patients fall within the high-risk group, please refer to Academy of Medicine report of screening test review committee for more information [(84)]. Available from: https://www.ams.edu.sg/viewpdf.aspx?file=media%5c4817_fi_59.pdf&ofile=STRC+Report+March+2019.pdf
d. Annual screening should be discontinued one the individual has quit smoking for more than 15 years, becomes medically unfit or unwilling to undergo invasive evaluation or anti-cancer treatment.

References

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Section 11. Vaccination Schedule

Vaccinations[85, 86]	Baseline	1 month/28 days	2 months/8 weeks	6 months	Every 12 months	Every 5 years	Every 10 years	≥65 years old	Comments
Influenza vaccine					√				One dose of influenza vaccine is recommended annually or per season under the National Adult Immunisation Schedule, depending on the prevailing recommendations for vaccination that year. Individuals who are recommended to receive the influenza vaccine include persons aged 18 or older with immunocompromising conditions, such as people living with HIV.
Pneumococcal conjugate vaccine (PCV20)	√								One dose of PCV20 is recommended under the National Adult Immunisation Schedule. Individuals who are recommended to receive PCV20 include persons aged 18 or older with immunocompromising conditions, such as people living with HIV, regardless of their CD4 count. • If individual has previously received one dose of PPSV23 only, PCV20 should be given at least 1 year from the last dose of PPSV23. • If individual has previously received one dose of PCV13 only, PCV20 should be given at least 1 year from the last dose of PCV13. • If individual has previously received one dose of PCV13, and either one or two doses of PPSV23, PCV20 should be given at least 5 years from the most recent dose of PCV13/PPSV23.
Pneumococcal conjugate vaccine (PCV13)	√								As an alternative regimen to PCV20, 1 dose of PCV13 is recommended in combination with 2 doses of PPSV23 under the National Adult Immunisation Schedule. Individuals who are recommended to receive PCV13 include persons aged 18 or older with

Vaccinations[85, 86]	Baseline	1 month/28 days	2 months/8 weeks	6 months	Every 12 months	Every 5 years	Every 10 years	≥65 years old	Comments
									immunocompromising conditions, such as people living with HIV, regardless of their CD4 count. • If individual has previously received one or two doses of PPSV23, PCV13 should be given at least 1 year from the last dose of PPSV23.
Pneumococcal polysaccharide vaccine (PPSV23)			√*			√†			As an alternative regimen to PCV20, 2 doses of PPSV23 are recommended in combination with PCV13 under the National Adult Immunisation Schedule. Individuals who are recommended to receive PPSV23 include persons aged 18 or older with immunocompromising conditions, such as people living with HIV, regardless of their CD4 count. *The first dose of PPSV23 should be given at least 8 weeks after PCV13 is given. † The next dose of PPSV23 should be administered at least 5 years after the first dose of PPSV23. f a dose of PPSV23 is given before PCV13, the next dose of PPSV23 should be given at least 8 weeks from PCV13 **and** at least **5 years** from the last dose of PPSV23, **whichever is later. Individuals can be given up to two doses of PPSV23; after which no further doses of PPSV23 should be given until the age of 65 years old.** PCV13, together with two doses of PPSV23 given before the age of 65 years old would complete the regimen under the National Adult Immunisation Schedule. Vaccine recommendations should be reviewed with the attending doctor again when the patient turns 65 years old.

Vaccinations[85, 86]	**Baseline**	**1 month/28 days**	**2 months/8 weeks**	**6 months**	**Every 12 months**	**Every 5 years**	**Every 10 years**	**≥65 years old**	**Comments**
Hepatitis A vaccine	√[€]			√					[€]HAV vaccines should only be offered to patients who are seronegative for HAV. Strongly encouraged for patients who have chronic liver disease, are MSM, or use drugs (injection or non-injection). Can consider delaying vaccination until CD4 >200 cells/mm^3. Consider assessing antibody response (anti-HAV IgG) at 1-2 months after vaccine series is completed.
Hepatitis B vaccine	√[¥]	√		√					Three doses of hepatitis B vaccine are recommended under the National Adult Immunisation Schedule for persons who have not been previously vaccinated or lack evidence of past infection or immunity. This may include people living with HIV. [¥]For patients who are seronegative for HBV and do not have chronic HBV infection. Assess antibody response (anti-HBs) at 1-2 months after vaccine series is completed. For patients with isolated anti-HBc, one standard dose of HBV vaccine can be given and anti-HBs titers to be assessed 1-2 months later. If the anti-HBs titer is ≥ 100 IU/mL, no further vaccination is required. If the titer is < 100 IU/mL, proceed to complete the full series of HBV vaccine, followed by checking of anti-HBs titres.
Hepatitis A and recombinant Hepatitis B vaccine (Twinrix)	√[±]	√		√					[±]For patients who are seronegative for both HBV and HAV.

Vaccinations[85, 86]	Baseline	1 month/28 days	2 months/8 weeks	6 months	Every 12 months	Every 5 years	Every 10 years	≥65 years old	Comments
Human papillomavirus vaccine Cervarix (HPV2), Gardasil 9 (HPV9)[a]	√	√^		√^					^There should be a minimum of 4 weeks' interval between the first and second dose, 12 weeks' minimum interval between the second and third dose, and 20 weeks minimum interval between first and third dose.
Tetanus, diphtheria, pertussis (Tdap) vaccine	√[£]						√		Tdap is recommended under the National Adult Immunisation Schedule for pregnant women during 16-32 weeks of each pregnancy for protection of the infant against pertussis, regardless of the interval since the previous Td or Tdap vaccination. [£]For patients who have never had Tdap vaccine should be offered the vaccine at initial visit. Subsequently, patients should have booster shots every 10 years.
Mumps, measles and rubella (MMR)	√[ŕ]	√							[ŕ]For patients with CD4 cell counts ≥200 cells/mm^3 who do not have evidence of MMR immunity (evidenced by serology) or no documented history of previous MMR vaccination. Non-immune individuals with HIV infection and a CD4 < 200 cells/ mm^3 should have these LIVE vaccines postponed until after they are immune-reconstituted because of the risk from live vaccines. Two doses of the MMR vaccine are recommended under the National Adult Immunisation Schedule for persons who have not been previously vaccinated or lack evidence of past infection or immunity. This may include people living with HIV.

Vaccinations[85, 86]	Baseline	1 month/28 days	2 months/8 weeks	6 months	Every 12 months	Every 5 years	Every 10 years	≥65 years old	Comments
Varicella vaccine	√[e]	√							[e]For patients with CD4 cell counts ≥200 cells/mm^3 who do not have evidence of varicella immunity (evidenced by serology) or no documented history of previous varicella vaccination or varicella infection that was diagnosed by a healthcare provider. Non-immune individuals with HIV infection and a CD4<200 cells/ mm^3 should have these LIVE vaccines postponed until after they are immune-reconstituted because of the risk from live vaccines. Two doses of varicella vaccine are recommended under the National Adult Immunisation Schedule for persons who have not been previously vaccinated or lack evidence of past infection or immunity. This may include people living with HIV.
COVID-19 mRNA vaccine (CD4 cell counts ≥200 cells/mm^3 and virologically suppressed)	√		√		√				Under the prevailing national recommendation for COVID-19 vaccination, (i) individuals aged 60 year and above, (ii) medically vulnerable individuals aged 6 months and above (including persons living with HIV) and (iii) residents of aged care facilities are recommended to receive both initial and additional doses. • Initial dose for unvaccinated individuals: - One vaccine dose for individuals without moderate or severe immunocompromised condition(s). - Enhanced three-dose primary series for individuals with moderate or severe immunocompromised condition(s), including advanced or untreated HIV (CD4 cell counts < 200 cells/mm^3 and/or uncontrolled viral load); second dose to be given 8 weeks after the first dose, and third dose 8 weeks after the second dose. • Additional dose:

Vaccinations[85, 86]	Baseline	1 month/28 days	2 months/8 weeks	6 months	Every 12 months	Every 5 years	Every 10 years	≥65 years old	Comments
									- One dose, at an interval of around 1 year after the last dose. (As the COVID-19 vaccination recommendations are rapidly evolving, physicians are advised to follow prevailing national recommendations)
Recombinant, herpes zoster vaccine (RHZV)	√□		√[r]						□Two doses of recombinant herpes zoster vaccine are recommended under the National Adult Immunisation Schedule for persons aged 18 or older with immunocompromising conditions, including people living with HIV (CD4 count 200 cells/mm^3), in an advanced state or untreated. The doses are recommended at an interval of 2-6 months. However, the interval between doses can be shorter at [r]1-2 months for persons with immunocompromising conditions. Verification of varicella immunity prior to receiving RHZV is not recommended regardless of age or medical condition. For persons who have previously received live, attenuated herpes zoster vaccine (HZVL), an interval of ≥5 years is recommended between HZVL and RHZV; a shorter interval of ≥12 months can be considered for adults aged 70 years or older.

Notes:

a. Under the National Adult Immunisation Schedule (NAIS), only females aged 18 to 26 years are recommended for HPV vaccination. Patients can only use Medisave for HPV vaccine if they are females between the age of 9 to 26 years old and are using the HPV2 vaccine (Cervarix). However, we encourage all people living with HIV to consider HPV vaccination to reduce their risk of cervical cancer and anal cancer. Medisave use and subsidies are available for NAIS vaccinations for eligible persons.

More details are available on HealthHub and MOH websites:

- https://www.vaccine.gov.sg/
- https://www.moh.gov.sg/managing-expenses/schemes-and-subsidies/childhood-developmental-screening-and-childhood-vaccinations/

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Section 12. Multi-disciplinary Care

Care and Counselling

Clinical Consideration	Recommendation
Counselling newly diagnosed patients with HIV at initial presentation	1) Explore patient's ability to cope with new diagnosis, taking into consideration biopsychosocial factors, including severity of illness, psychological issues and social situation[87] i) Emotional/psychological coping • Explore and assess emotional coping with HIV diagnosis as well as other matters including past and present issues relating to substance use, mental health and trauma[88-90] • Discuss and address concerns of HIV-related stigma and discrimination[91] • Provide psychosocial support and refer to community services as needed[92] ii) Social support • Obtain social and family background • Discuss, explore and document disclosure of HIV diagnosis[93] • Explore and assess patient's social support network and link patient to peer support, support group or community support if needed[94] • Provide support to family and support network as needed iii) Employment and financial situation • Assess employment and financial situation: o To determine patient's ability to afford, access and adhere to treatment o To manage daily expenses • Refer to relevant agencies for employment and/or financial assistance as needed 2) Provide psychoeducation i) Understanding of HIV • Assess patient's understanding of HIV, HIV treatment and adherence. • Identify and assess facilitators and barriers to treatment adherence[92, 95-97] ii) HIV transmission • Explore risk behaviours and discuss ways to prevent onward transmission[97] • Educate on safer sexual practices, including concept of undetectable equals untransmittable (U=U)

Clinical Consideration	Recommendation
	• Inform the patient of the Infectious Diseases Act (Chapter 137)[98]
Subsequent sessions and follow-up	1) Biopsychosocial assessment of coping with HIV and other chronic illnesses. <u>Biological</u> • Ongoing assessment of coping with HIV diagnosis and chronic illnesses • Assess understanding of comorbidities such as diabetes, cardiovascular, respiratory and hepatic diseases • Assess the impact of patient's comorbidities on their daily living especially in their cognitive and functional aspects[99] <u>Psychological</u> • Assess impact of patient's mental health wellbeing on their daily living[99] • Support and counsel patient who experiences associated anxiety and worries from stigmatization and isolation, as well as those who have mental health concerns. • Assess patient's coping mechanisms • Assess patient's coping with comorbidities <u>Social</u> • Assess patient's social support network and render support as needed • Refer to community financial resources for financially needy patients to cope with their daily living expenses[99] • Refer for employment support services and work rehabilitation as needed[100] • Linkages to peer support, befrienders or community mental health, and other community resources[99, 101, 102] • Support patients' decisions for disclosure to potential caregivers or partners • Link patient to community resources • Identify barriers and assist patient to access medical treatment <u>Psychosocial Support and End-of-Life Care</u> • Discussions with patients on spiritual aspects such as meaning of life, beliefs and hopes[99] • Discussion with patients on Advance Care Planning, Lasting Power of Attorney, Will, and CPF nomination (institution specific)[103-107]

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Pharmacy

Pharmacists, with their extensive knowledge on medications, serve as a bridge between physicians and patients. In addition, pharmacists provide accessible and non-stigmatising avenues for patients to address their healthcare needs. Besides providing education on medications, pharmacists can actively contribute to the holistic care of people living with HIV in the following settings[108]:

- Treatment of HIV infection, including management of HIV treatment failure
- Management of HIV disease state complications
- Treatment and prevention of opportunistic infections
- Prevention of HIV infection via pre-exposure prophylaxis (PrEP)

It is essential that pharmacists are familiar with the guidelines pertaining to the management of HIV infection and its complications and the primary care management of people living with HIV. A list of useful references is provided at the end of this section.

It is also important that resources and training are provided to support the expanding roles of pharmacists in HIV care. Adequately trained pharmacists can contribute to the multidisciplinary team through collaborative prescribing in pharmacist-run HIV clinics.

Role of Pharmacists in HIV Care

As part of a multidisciplinary HIV team, pharmacists are involved in the following aspects of patient care[108]:

1. **Patient assessment and laboratory testing**
   a. Pharmacists should perform detailed review of the patient's medical conditions, co-infections, social history, and laboratory results, if available, at every visit (e.g., CD4 cell count, HIV viral load, HIV genotype test, renal panel, liver function test, G6PD, HLA-B*5701). Pharmacists should be familiar with the laboratory tests that are essential for the recommendation of appropriate treatment and the long-term management of the patient.
   b. Comprehensive medication reconciliation should also be performed to facilitate selection of the most appropriate ART regimen and to identify any potential drug interactions. Pharmacists should check for all prescription and non-prescription medicines, vitamins and supplements, and traditional or complementary medicines that the patient may be taking.

2. **Initiation of ART**
   a. Pharmacists must be familiar with the latest updates and guidelines on preferred ART regimens, taking into account local practices and considerations. Please refer to this link for the NHIVP's

Recommendations for the Use of Antiretroviral Therapy (ART) in Adults Living in Singapore. Pharmacists should also be familiar with various ART agents and formulations available.

b. As part of a multidisciplinary HIV team, pharmacists should contribute to the assessment of patient's readiness to initiate ART and identification of any potential adherence barriers.
c. To maximise adherence to medications, the ART regimen should be individualised to patient-specific needs, such as but not limited to, baseline viral load and CD4+ T-lymphocyte count, comorbidities, potential drug-drug interactions with concurrent medications and supplements, patient's preference and need for convenience, lifestyle patterns, and available finances to pay for medication costs.

3. Follow-up and Monitoring

a. Patient should continue to be followed up with a pharmacist at each clinic visit to assess for:
    i. Efficacy and adverse effects from ART regimen
    ii. Adherence to medication regimen
    iii. Any new medications, vitamins and supplements, and traditional or complementary medications or any changes to existing medications
    iv. Any other concerns or questions that the patient may have

b. Patient-reported outcome measures, when applicable, may be utilised for follow-up and monitoring. These tools may assist in monitoring patient's treatment adherence and satisfaction in a non-judgemental manner.
c. Pharmacists should discuss with the patient on the strategies to mitigate any drug-related issues identified during follow-up visits.
    i. Pharmacists may refer to the National Institutes of Health (NIH) guidelines (Section on Adverse Effects of Antiretroviral Agents) for common adverse effects from ART agents and their management[61].
    ii. Pharmacists should consult primary resources specific to HIV medications as well as the primary literature when necessary to assess and manage drug interactions appropriately. Available resources include the NIH guidelines (Section on Drug-Drug Interactions) and the Liverpool HIV interactions via https://www.hiv-druginteractions.org [61]
    iii. Please refer to point 4 for addressing issues with drug adherence.

d. Pharmacists may also assist in simplifying ART regimens among patients who are virologically suppressed.

4. Drug adherence and its barriers

a. Adherence assessment must be performed at every clinic visit, using a positive and non-judgemental approach. This can be assessed using:
    i. Objective and indirect indicators, such as CD4+ T-lymphocyte count, HIV viral load; pharmacy refill records on electronic medical records such as NEHR[109, 110].
    ii. Patient-reported adherence[109, 110]. Asking patients about adherence over the last 3-7 days may give a good reflection on long-term adherence[109].

b. Pharmacists should be familiar with common barriers to adherence among people living with HIV and identify them at every opportunity. Some of these barriers include[61, 108, 110]:
    i. Inability to understand dosing instructions
    ii. Complicated regimen (high pill burden, large pill size, complicated dosing schedule, dietary restrictions or food requirements, polypharmacy)

iii. Pill aversion or pill fatigue
iv. Adverse effects
v. Inadequate understanding of drug resistance and its relationship to adherence
vi. Financial or social issues such as depression, drug or alcohol abuse, homelessness, poverty
vii. Stigma of taking medications

c. Pharmacists may utilise the following strategies to improve medication adherence[61, 109, 110]
   i. Simplifying ART regimens (combination pill, once-daily regimen, smaller pill size or liquid formulation, long-acting injection)
   ii. Adherence-related tools (pill box, calendar, handphone reminders/alarms)
   iii. Motivational interviewing
   iv. Medication therapy management to reduce polypharmacy
   v. Directly observed therapy (DOT) or tele-DOT

Pharmacists may also refer to NIH guidelines (Section on Adherence to Continuum of Care) and https://www.cdc.gov/hiv/research/interventionresearch/compendium/index.html for best practices to optimise medication adherence[61]. Pharmacists should recognize that a multi-disciplinary approach may be required to address patient's adherence barriers.

d. If liquid formulations are unavailable, pharmacists should refer to the prevailing literature, in addition to product inserts, to establish suitability of crushing ART medications for patients with swallowing difficulties. They may also refer to Oral Antiretroviral/HCV DAA Administration: Information on Crushing and Liquid Drug Formulations at https://www.hivclinic.ca/main/drugs_extra_files/Crushing%20and%20Liquid%20ARV%20Formulations.pdf

5. Access to antiretroviral medications

a. Pharmacists should work together with the HIV team to review the inventory and formulary of ARTs and HIV-related medications. They should ensure the appropriate medications are available and accessible to patients.
b. Pharmacists should work closely with Medical Social Workers to ensure that the various types of financial subsidies for ARTs and other HIV-related medications are available to patients. These include the use of Medisave, Medifund, Medishield, Medication Assistance Fund and CHAS, where appropriate.

6. Management of concurrent comorbidities and HIV disease state complications

a. Comorbidities are common among people living with HIV as current ART regimens have been effective in reducing AIDS-related mortality and prolonging the lifespan of people living with HIV. However, HIV or ART regimens may also increase their risk of developing certain comorbidities. Hence, pharmacists should be well versed in the management of common chronic conditions. They should also recognise the possible links between HIV, ART and several disease states and the differences in their management compared to the general population with similar comorbidities.
b. To provide holistic care to people living with HIV, pharmacists can assist in screening, prevention, treatment and monitoring of chronic diseases such as hypertension, hypercholesterolemia, diabetes, cardiovascular disease, chronic kidney disease and osteoporosis. Medication therapy management, if required, should be performed at every opportunity.

7. Management of opportunistic infections (OIs)

a. Pharmacists can assist in ensuring people living with HIV receive the appropriate regimens for OI prophylaxis and treatment.
b. Pharmacists should assist in monitoring for efficacy and safety of OI treatment and prophylaxis, ensuring adherence to these medications and avoiding drug-drug interactions.
c. Pharmacists should ensure access and availability of the medications used for OI treatment and prophylaxis.
d. Pharmacists can facilitate vaccination programs for people living with HIV to ensure they receive timely vaccinations. These include but not limited to influenza vaccine, pneumococcal vaccine, hepatitis A and B vaccines, HPV vaccine and zoster vaccine.

8. Prevention of HIV infection

a. Pharmacists can provide PrEP services for patients at high risk of HIV infection through collaborative prescribing agreement with medical collaborators.

Resources for further reading:

1. ASHP Guidelines on Pharmacist Involvement in HIV Care
2. https://www.ncid.sg/About-NCID/OurDepartments/Pages/National-HIV-Programme.aspx (National Recommendations and Guidelines in Singapore)
3. https://clinicalinfo.hiv.gov/en/guidelines (National Institute of Health Clinical Practice Guidelines for HIV/AIDS)
4. https://www.who.int/publications/i/item/9789240031593 (WHO Guidelines 2021)
5. https://www.eacsociety.org/guidelines/eacs-guidelines (European AIDS Clinical Society Guidelines for management of people living with HIV)
6. https://wwwn.cdc.gov/HIVCompendium/SearchInterventions (Best practice interventions to improve medication adherence)

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Nursing Care

The role of nursing professionals in the care and management of people living with HIV cannot be overstated. Nurses may provide care across the spectrum of needs for patients, and in both the inpatient and outpatient settings. Importantly, the role played by HIV-trained nurses are not limited to nursing interventions, but may include counselling, behavioural change interventions, and screening for frailty, co-morbidities and polypharmacy. In these respects, nurses may complement and enhance the holistic care provided by HIV clinical services within a care institution.

We recommend that HIV nurses be involved in every aspect of HIV care, including the application of recommendations set out in other sections of this document. These may include:

- Holistic management of people living with HIV with chronic metabolic conditions such as diabetes mellitus, hyperlipidaemia and hypertension; encompassing advice on dietary modification, physical activity, smoking cessation, adherence to pharmacologic therapy and drug reconciliation in the setting of polypharmacy, and management of psychosocial dimensions of these co-morbid conditions
- Management of osteopenia and osteoporosis, particularly with respect to prevention of fragility fractures through pharmacologic and non-pharmacologic interventions
- Encouraging and facilitating age-appropriate screening for cancers
- Screening for age-related conditions, such as frailty and pre-frailty, and geriatric syndromes; and facilitating the appropriate referrals for subsequent management
- Collaborating with other healthcare professionals, such as pharmacists (in the implementation of drug reconciliation, screening for drug-drug interactions and counselling on treatment adherence) and medical social workers and counsellors (in providing psychosocial support and counselling).

Refer to **Annex B** for details on how the above measures may be implemented by HIV nurses in the context of a multi-disciplinary HIV clinical service.

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Annex A

Mental Health Screening Tools

PHQ-2

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	+1	+2	+3
2. Feeling down, depressed or hopeless	0	+1	+2	+3

Interpretation:

- A PHQ-2 score ranges from 0-6. The authors identified a score of 3 as the optimal cut-off point when using the PHQ-2 to screen for depression.
- If the score is 3 or greater, major depressive disorder is likely.
- Patients who screen positive should be further evaluated with the PHQ-9, other diagnostic instruments, or direct interview to determine whether they meet criteria for a depressive disorder.

PHQ-9

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	+1	+2	+3
2. Feeling down, depressed or hopeless	0	+1	+2	+3
3. Trouble falling asleep, staying asleep, or sleeping too much	0	+1	+2	+3
4. Feeling tired or having little energy	0	+1	+2	+3
5. Poor appetite or overeating	0	+1	+2	+3
6. Feeling bad about yourself - or that you're a failure or have let yourself or your family down	0	+1	+2	+3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	+1	+2	+3
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite - being so fidgety or restless that you have been moving around a lot more than usual	0	+1	+2	+3

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	+1	+2	+3

Interpretation:

- Total scores of 5, 10, 15, and 20 represent cut-off points for mild, moderate, moderately severe and severe depression, respectively.
- Note: Question 9 is a single screening question on suicide risk. A patient who answers yes to question 9 needs further assessment for suicide risk by an individual who is competent to assess this risk.

Annex B

Diabetes Mellitus

Physical Activity	1. Patients with type 2 diabetes should undertake ≥150 mins/week of moderate to vigorous aerobic exercise spread out over a minimum of 3 days of the week, with no more than 2 consecutive days between bouts of exercise 2. All adults, and particularly those with type 2 diabetes, should decrease the amount of time spent in daily sedentary behaviour. Prolonged sitting should be interrupted every 30 mins, which benefits blood glucose levels 3. Flexibility training and balance training are recommended 2–3 times/week for older adults with diabetes. Yoga and tai chi may be included based on individual preferences to increase flexibility, muscular strength, and balance 4. Evaluate baseline physical activity and sedentary time. Promote increase in non-sedentary activities above baseline for sedentary patients with type 1 and type 2 diabetes. Examples include walking, yoga, housework, gardening, swimming, and dancing 5. Patients with diabetes, especially those on insulin treatment or secretagogues, may require medication dose adjustments and should receive specific education on the prevention of exercise-induced hypoglycaemia
Smoking cessation: Tobacco and E-Cigarettes	1. Advise all patients not to use cigarettes, other tobacco products or e-cigarettes 2. For patients who smoke, counsel for smoking cessation
DSME	People with diabetes should receive DSME when their diabetes is diagnosed and as needed thereafter 1. Patient education on diabetes diagnosis, pathogenesis, complication and pharmacotherapy and non-pharmacotherapy should be provided 2. Discuss and set HbA1c treatment target with patient 3. Patients on insulin must be equipped with the skills and knowledge on insulin administration, self-monitoring of blood glucose, hypoglycaemia management, matching of insulin dose and carbohydrate intake, and dose adjustments during sick days, travel, exercise, and changes in food intake 4. Self-monitoring of blood glucose is recommended for patients with type 1 or type 2 diabetes who are using insulin 5. Self-monitoring of blood glucose should be considered in the following groups of patients with type 2 diabetes who are not treated with insulin: • Those at increased risk of developing hypoglycaemia or its consequences (e.g., patients who are using sulphonylureas) • Pregnant patients with pre-existing diabetes or gestational diabetes • Those experiencing acute illness • Those who have failed to achieve glycaemic goals • Those undergoing fasting, for example, during Ramadan 6. Self-monitoring of blood glucose should be carried out 3 or more times daily for patients with type 1 diabetes

	7. For patients with unstable metabolic control, changes in daily routine, alterations of treatment regimens or acute illness, the frequency of self-monitoring of blood glucose should be increased 8. Patients must be educated on the interpretation of glucose levels 9. Continuous glucose monitoring (CGM) may be used as a supplemental tool to SMBG in patients with hypoglycaemia unawareness and/or frequent hypoglycaemic episodes
Psychosocial issues	1. Assessment of psychological and social wellbeing should be included as part of diabetes management 2. Psychosocial support to patient during diagnosis phase of diabetes management includes: • Provide medical information and psychological support • Be accessible and sensitive to patient's needs • Repeat the information given to patient if necessary as they may not be able to retain much at this stage • Introduce them to other patients for additional support • Involve other family members if necessary 3. Psychosocial support to patient during the maintenance phase of diabetes management includes: • Motivate patient and family to maintain optimal control • Create an individualized regimen for patient to encourage adherence • Ensure good support from diabetes team • Check for signs of diabetes burnout[c] • Consider educational intervention, e.g. Group therapy • Follow up and review behavioural changes • Modify treatment if necessary 4. Psychosocial support to patient during the complication phase of diabetes management includes: • Giving patients the space to vent and providing them with a lot of realistic reassurance is important • Do not overwhelm patients with information • Encourage patients to maintain adherence to treatment regimen and provide information on importance of adherence to treatment
Abbreviations: DSME, Diabetes Self-Management Education; HbA1c, glycated haemoglobin	

The above table is adapted from the comprehensive medical evaluation and assessment of comorbidities: standards of medical care in Diabetes-2022 and facilitating behaviour change and well-being to improve health outcomes[111, 112].

Notes:

a. If weight reduction is needed, it should be attempted gradually (0.25 to 1.0 kg/week). In overweight or obese patients with type 2 diabetes, a weight loss of 5-10% of body weight achieved through lifestyle interventions is a realistic goal
b. One standard drink is 10g of alcohol which is the equivalent of 2/3 can of 220ml beer, one small 100ml glass of wine or 1 nip (30ml) of spirits
c. Diabetes Burnout: describes a feeling of physical and emotional exhaustion due to the demands of living with and managing diabetes. Diabetes burnout may present as being unmotivated in DM management which gives rise to greater risk of hyperglycaemia

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Lipids - Lifestyle changes

Tobacco Smoking	Patient who smokes should be strongly advised to stop smoking
Weight Reduction	If body mass index >23 kg/m^2, weight reduction through diet modification and exercise is recommended
Exercise	Persons with dyslipidaemia should undertake 150 - 300 minutes per week (~ 30 - 60 minutes per day) of moderate-intensity aerobic activity spread out over 5 - 7 days per week
Alcohol Consumption	Patients who do not currently consume alcohol should not start. For patients who do consume alcohol, the recommendation is no more than one standard drink per day for adult women. and no more than two standard drinks for adult men.

The above table is adapted from the ACG on lipid management [51]. For further information, please refer to: https://www.ace-hta.gov.sg/healthcare-professionals/ace-repository-for-clinical-guidelines/lipid-management-focus-on-cardiovascular-risk/

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Hypertension

Lifestyle Modifications	1. Advise patient to restrict salt intake 2. Alcohol consumption to no more than one standard drink per day for adult women and no more than two standard drinks for adult men 3. Increase the consumption of vegetables, fruits, low-fat dairy products, and decrease the intake of saturated and total fats 4. Unless contraindicated, advise patients to reduce weight to a BMI below 23 kg/m2 and to a waist circumference below 90cm in men, and below 80cm in women (for Asians) 5. Advise patients to do at least 30 minutes of moderate-intensity exercise 5 to 7 days per week. Any physical exercise above the basal level, up to about 150 minutes a week, confers incremental cardiovascular and metabolic benefits, including BP reduction 6. Advise and offer assistance to all smokers to quit smoking

The above table is adapted from the ACG on hypertension[31]. For further information, please go to: https://www.ace-hta.gov.sg/healthcare-professionals/ace-clinical-guidances-(acgs)/details/hypertension-tailoring-the-management-plan-to-optimise-blood-pressure-control

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Osteoporosis

Lifestyle management	1. Calcium Intake: Singapore Health Promotion Board recommends that adult Singaporeans should consume 800 - 1000mg/day of calcium from their diet and/or calcium supplement 2. Vitamin D: Vitamin D supplementation (with calcium) should be considered in most patients, particularly in the elderly and institutionalized. Care should be taken to avoid hypercalcemia when prescribing calcium and vitamin D in combination. 3. Exercise: • Resistance exercise, either free weights or weight machines as an intensity of 70-80% of maximum heart rate and 10 - 15 repetitions at low to moderate weight • Weight-bearing exercises like aerobic, brisk walking, jogging, skipping and dancing at an intensity of 50 - 70% of maximal heart rate. • The frequency of exercise should be at least 2 - 3 times per week, each lasting about 50 - 60 minute which would include 10 mins warm up, 20 minutes impact, 15 minutes resistance and 10 minutes cool down • Precautions should be taken when recommending exercise to patients with established osteoporosis
Prevention of fall	1. Older people in the care of healthcare professionals should be routinely asked history of falls in the last year and asked about the frequency, context and characteristics of the fall 2. Older people who presented for medical attention because of a fall or history of falls in the past year, or demonstrated abnormalities of gait and/or balance should be offered a multifactorial fall risk assessment 3. Following treatment for an injurious fall, older people should be offered an assessment to identify and address future risks and intervention aimed at promoting independence and improving physical and psychological function 4. Older people who have risk factors for falls or have recurrent falls should have targeted multifactorial interventions. These interventions should include treatment of identified reversible medical problems, medication adjustments, home hazard assessment and modification, physical therapy and vision correction
Use of hip protectors	The use of hip protectors is recommended for the prevention of hip fractures in older people. It may be used in people with a high predicted risk of hip fracture, particularly nursing home residents

Cigarette smoking and excessive alcohol consumption	Cigarette smoking and excessive alcohol consumption are both associated with increased risk of osteoporotic fracture, and hence it is recommended that patients be counselled on smoking cessation and limiting alcohol consumption

The above table is adapted from the Appropriate Care Guide: Osteoporosis-identification and management in primary care by the ACE on osteoporosis[45] . For more information, please go to: https://isomer-user-content.by.gov.sg/68/273c2742-649f-48d5-9794-fb71e7b70177/Osteoporosis%20diagnosis%20and%20management%20(Aug%202025).pdf

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Falls Screening and Prevention

Single Interventions	1. Exercise Interventions: • Exercise programmes for falls prevention should consist of a twice-weekly programme for > 25 weeks, with each session lasting 60 minutes • Exercise intensity can be pegged at a moderate level. These exercises should be progressive and individualised to maximise the effectiveness of the programme • Exercise should consist of a mix of balance and coordination training, lower limb strengthening, endurance and flexibility training 2. Home Modification • Older adults assessed to have high risk of falls, history of falls or those with visual impairment should be referred to occupational therapists for home assessment and modification intervention 3. Footwear • Older adults should be advised to wear well-fitted shoes with low heeled slip resistant soles and a large contact area to reduce falls 4. Medication Review and Modification • Medication review and modification to optimise mediation use should be provided by the primary care physician in collaboration with a pharmacist and other clinical specialists • Psychotropic medications (benzodiazepines and antipsychotics) should be discontinued in older adults (if possible) to prevent falls. This should be done with appropriate tapering of doses, close monitoring of outcomes and input from clinical specialists if necessary 5. Vitamin D Supplementation 6. Improving Vision • Older adults who have impaired vision should be referred for further evaluation of the cause of impairment • Persons with cataracts as the main cause of vision impairment should be referred for cataract surgery

	7. Cardiac Pacemaker insertion • Older adults with suspected cardiogenic falls should be referred to the cardiologist for further evaluation and intervention 8. Education Interventions • Provide basic information on falls and educate older adults on the benefits of falls prevention strategies in preventing falls and maintaining independence
Multiple Interventions	Older adults at risk of falls should be considered for referral to available fall prevention programmes
Multi-factorial Interventions	Older adults assessed to be at high risk of falls should receive interventions targeted at the individually identified risk factors

The above table is adapted from the MOH clinical practice guidelines on fall prevention among older adults living in the community[113]. For more information, please go to: https://sma.org.sg/UploadedImg/files/SMJ/5605/5605cpg1.pdf

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	• Action for AIDS • Oogachaga • Project X • The Greenhouse • Inter-university LGBT Network • Persons living with HIV

Composition and Terms of Reference of the Advisory Group for the Primary Care Recommendations for People Living with HIV (FY2024 – 2025)

Membership

The Primary Care Recommendations for People Living with HIV Advisory Group is a select group of stakeholders who are involved in the work of HIV prevention and care management. Members are chosen based on their expertise in the relevant fields to join the National HIV Programme (NHIVP)'s efforts in coordinating the national HIV response. This Terms of Reference is effective from 1 April 2024 to 31 March 2026 unless terminated by agreement between the parties.

The Advisory Group comprises of:

- Dr Rinkoo Dalan, Senior Consultant, Endocrinology, TTSH
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- Dr Chew Ling Hui Justin, Consultant, ICC-Geriatric Medicine, TTSH
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Purpose

The Primary Care Recommendations for People Living with HIV Advisory Group serves to provide the NHIVP with input and guidance regarding non-HIV related care specific to people living with HIV infection. To be effective, the advisory group will adopt the following operating procedures:

1. Providing input on the current primary care services and practices for people living with HIV, as well as areas for improvements
2. Adapting international guidelines to the local context
3. Drafting the NHIVP Primary Care Recommendations for People Living with HIV
4. Review all written materials for quality assurance
5. Utilising local data to inform primary care services and best practices

Responsibilities, Powers, and Procedures

1. Members will participate in email communications, and in-person meetings upon request.
2. The NHIVP Executive will act as secretariat to the advisory group and will:
    - Develop and disseminate meeting schedules

- Consult with the advisory group to determine meeting topics and agenda
- Organise presentations for meetings where relevant
- Manage online communication and dissemination of relevant information
- Record and distribute meeting minutes
- Act as the main point of contact for programme-related questions or issues

3. Members' responsibilities are to:
   - Attend all advisory group meetings, or where attendance is not possible, submit an apology
   - Participate actively and work cooperatively with other members
   - Prepare for all meetings by reading and considering the agenda items, papers circulated and other relevant documents
   - Provide review of current materials for adaptation to the Singapore context
   - Advise on implementation of initiatives in Singapore
   - Respect group procedures, decisions and diverging opinions expressed by other members
   - Agree to the advisory group's privacy and confidentiality agreement

Remuneration
Advisory group members are requested to participate voluntarily. No sitting fees will be provided.

Privacy and Confidentiality
To ensure effective consultation between the NHIVP and the advisory group members, sensitive information that is not available in the public domain may sometimes be disclosed and shared at advisory group meetings or through emails on a confidential basis. This includes discussions on the group's mailing list. Members are expected to be mindful of the confidentiality of this information and should not disclose it to outside parties.

If members are unsure about the confidentiality status of specific information or data disclosed to them, the Chair (Director, National HIV Programme) should be consulted for clarification.