Strengthening Interprofessional Education for HIV

Module 23

Non-Communicable Diseases (NCDs) in People with HIV

Learner Guide

OVERVIEW

Goal

The goal of this session is to educate learners on key management principles of select non-communicable diseases (NCDs), while highlighting how care may differ for people with HIV (PWH) compared to the general population.

Objectives

By the end of the module, the learner will be able to:

1. Accurately diagnose diabetes mellitus (DM) in people with HIV (PWH)
2. Recognize how diabetes management is unique among PWH
3. Medically manage a fragility fracture among PWH
4. Calculate a patient's estimated glomerular filtration rate (eGFR) to correctly dose antiretroviral therapy
5. Within the scope of your health profession, describe how you would support a woman with HIV who has signs and symptoms of cervical cancer (IPE)
6. List cancer screening strategies for PWH in your context

PEPFAR

HRSA Health Resources & Services Administration

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AFRE health African Forum for Research and Education in Health

Workshop Roadmap

Duration: 120 minutes

Duration	Activity	Content
5 min.	Introduction	
20 min.	1. Small group work	Diabetes diagnosis
25 min.	2. Multi-disciplinary rounds	Diabetes management
20 min.	3. Small group work	Fragility fractures
10 min.	4. Group discussion	eGFR calculation
25 min.	5. Large group and small group work	Cervical cancer diagnosis
10 min.	6. Group discussion	Cancer screening strategies
5 min.	Conclusion	

Workshop Setup

Additional learner materials

- HEARTS-D Diagnosis and Management of Type 2 Diabetes: pages 13-15, 25
- Osteoporosis Management Algorithm
- Comprehensive Cervical Cancer Control (WHO): pages 170-173

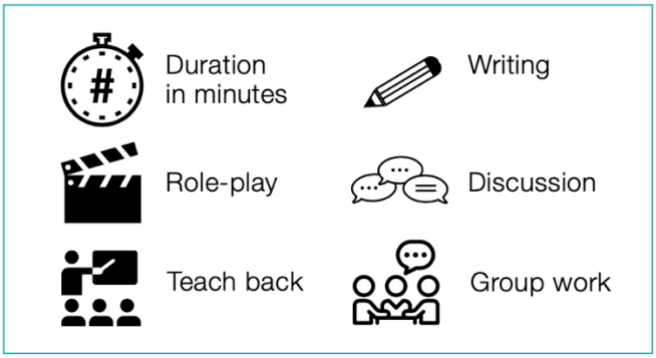
Abbreviations

ABC	abacavir
ART	antiretroviral therapy
AZT	zidovudine
CKD	chronic kidney disease
d4T	stavudine
ddI	didanosine
DM	diabetes mellitus
DTG	dolutegravir
eGFR	estimated glomerular filtration rate
HbA1c	hemoglobin A1c
IPE	interprofessional education
MCV	mean corpuscular volume
NCD	non-communicable diseases
NRTI	nucleotide reverse transcriptase inhibitor
PWH	people with Human Immunodeficiency Virus
RBC	red blood cell
TLD	tenofovir-lamivudine-dolutegravir
WHO	World Health Organization
ZDV	zidovudine

TEACHING CONTENT WITH OBJECTIVES

Introduction

Activity Components



Case: Neo is a 59-year-old woman with long-standing, well-controlled HIV on tenofovir-lamivudine-dolutegravir (TLD). She comes to the clinic for routine HIV care where she reports high levels of medication adherence and is noted to have an undetectable viral load for many years. Neo's main complaint in clinic is her steady weight gain. She reports being underweight when she first started HIV treatment 12 years ago and she quickly gained weight in the following years. At first, she was relieved by the weight gain as she thought she looked and felt healthier. Over the last two or three years, however, she has continued to gain weight to the point that her clothes are no longer fitting, and she is troubled by knee and back pains which have limited her physical activity.

ACTIVITY 1

Accurately diagnose diabetes mellitus (DM) in people with HIV (PWH)

The clinician is able to review Neo's weight from the last six years and finds that it increased from 74kg to 91kg. In the setting of this weight gain, the clinician would like to screen Neo for metabolic complications such as hypertension, elevated cholesterol, and diabetes.

In small groups discuss how you would screen Neo for diabetes. What questions would you ask her to assess the likelihood of diabetes? What laboratory tests would you request to diagnose diabetes?

Neo is asked to go to the laboratory the next morning for a fasting blood sugar and a hemoglobin A1c (HbA1c). She is instructed to have no caloric intake for at least 8 hours prior to the test (water is permissible). She is scheduled in clinic the following week when her results return.

In small groups review the following lab results and determine if each hypothetical patient has normal results or diabetes. Assume that each blood glucose level was confirmed with a repeat test. Use page 13 from the World Health Organization (WHO) HEARTS-D guidelines.

Patient	Fasting? (Y/N)	Plasma glucose	HbA1c	Criteria met for diabetes? (Y/N)
Patient A	Yes	7.3 mmol/L (131 mg/dL)	[none]	
Patient B	No	10.0 mmol/L. (180 mg/dL)	6.4% (46 mmol/mol)	
Patient C	No	11.5 mmol/L. (207 mg/dL)	6.2% (44 mmol/mol)	
Patient D	Yes	7.6 mmol/L. (137 mg/dL)	6.7% (50 mmol/mol)	
Patient E	No	12.1 mmol/L (218 mg/dL)	[none]	

Neo's laboratory studies return with a fasting glucose of 8.4 mmol/L (151 mg/dL)—which is confirmed after a second study—and a HbA1c of 6.4% (46 mmol/mol). She is told that she has diabetes mellitus and will need to discuss treatment. Neo is worried to hear about this diagnosis and wonders if she really has diabetes since her HbA1c did not meet the criteria for diabetes.

What could explain the discrepancy between Neo's fasting blood sugar result and her HbA1c?

Do you think Neo has type I or type II diabetes mellitus? What risk factors might Neo have that inform your assessment?

CLINICIAN'S CORNER

HbA1c reflects blood sugar accumulation on red blood cell (RBC) hemoglobin over a 3-month period. Inappropriately low levels likely reflect the more rapid removal of RBCs among some PWH (i.e. very low-grade hemolysis). HbA1c discordance is more common in patients with an elevated mean corpuscular volume (MCV) as these enlarged RBCs may be removed from circulation more rapidly. HbA1c discordance is more common in PWH on ART. Certain nucleotide reverse transcriptase inhibitors (NRTIs) (particularly abacavir (ABC) and zidovudine (AZT)) may be implicated. Some professional guidelines do not recommend checking HbA1c in PWH, while others recommend using the test but pairing with blood glucose levels and interpreting HbA1c results with caution.

ACTIVITY 2

Recognize how diabetes management is unique among PWH

Neo has been told that her fasting plasma glucose level indicates that she has diabetes. Pharmacologic and non-pharmacologic management are then discussed.

Diabetes management—much like HIV management—is best conducted by an interprofessional team that can draw upon the skills of each health profession. In your small groups, first conduct multi-disciplinary rounds. Begin by having a clinician summarize the case and then allow each profession to share how they can contribute to the care of PWH with diabetes. Next, answer the following questions as a group. Use pages 14-15 and 25 from the World Health Organization (WHO) HEARTS-D guidelines.

Question	Sample Answer
What "lifestyle" changes (such as diet and exercise) can help manage diabetes?	
What is the fasting glucose goal for patients with diabetes?	
What medication is first line for patients with diabetes who are above the fasting glucose goal? When is it contraindicated?	
Are there significant drug-drug interactions between this first-line diabetes medication and ART?*	
What complications should clinicians monitor for among PWH with diabetes?**	
What sort of psychosocial support may patients with diabetes need to adequately manage this condition?	

*The University of Liverpool has an excellent drug-drug interaction checker for HIV medications. It is available for free at: https://www.hiv-druginteractions.org/. There is also a smartphone app called "Liverpool HIV iChart".

**Prevention of cardiovascular disease (among those with and without diabetes)—including blood pressure control and dyslipidemia treatment—is addressed in Module 2. More details can be found in the WHO Technical package for cardiovascular disease management in primary health care (https://www.who.int/publications/i/item/9789240001367)

ACTIVITY 3

Medically manage a fragility fracture among PWH

Neo is treated with metformin and continued TLD. She continues to maintain excellent control of her HIV, but she struggles to remember to take her metformin and her fasting glucose levels are consistently around 11.5 mmol/L (207 mg/dL). A year later she develops a severe COVID-19 infection with hypoxemia. She is briefly admitted to the hospital and during her stay a chest x-ray is notable for scattered pulmonary infiltrates and a compression fracture of her thoracic spine. Neo recovers from COVID-19 and returns to clinic to see you. She denies any current or prior back pain or trauma to the region.

Does Neo have osteoporosis? Why or why not? Use the "Osteoporosis Management Algorithm" in Additional Learner Materials (ALM) to answer this question.

How is osteoporosis treated? Use the "Osteoporosis Management Algorithm" to answer the following questions in small groups:

1. What non-pharmacologic measures are recommended to treat osteoporosis?

2. When should calcium supplementation be started for patients with osteoporosis?

3. When is vitamin D supplementation recommended for patients with osteoporosis?

4. If a bisphosphonate (such as alendronate) is used to treat osteoporosis, how should it be taken?

5. What ART agents should be avoided (if possible) in patients with osteoporosis?

ACTIVITY 4

Calculate a patient's estimated glomerular filtration rate (eGFR) to correctly dose antiretroviral therapy.

Neo's HIV regimen is changed to abacavir + lamivudine (3TC) with dolutegravir. She is started on calcium and vitamin D but a bisphosphonate is not available. One month later she trips over an object when getting up in the middle of the night to use the bathroom and lands awkwardly on her left wrist. She initially decides not to seek medical care and instead treats the pain and swelling with high doses of non-steroidal anti-inflammatory (NSAID) medications for over the next four weeks. She then comes

into clinic complaining of continued pain and swelling in the wrist (with difficulty bending it) as well as a decrease in her urine output, and new onset vaginal bleeding.

An x-ray of Neo's left wrist confirms a fracture of the distal radius. Her labs are notable for a normal hemoglobin and hematocrit but an elevated creatinine of 2.4 mg/dL (212 umol/L). A subsequent urinalysis demonstrates 1+ protein and is negative for WBCs and RBCs.

- What equation would you use to calculate Neo's estimated glomerular filtration rate (eGFR) or creatinine clearance (CrCl)? Do you have a preferred resource that you use to calculate eGFR or CrCl?

- In what scenarios may eGFR or CrCl calculation be inaccurate?

- Neo is now 60 years old and weighs 88kg. What is her eGFR?

CLINICIAN'S CORNER

Calculating eGFR is critical to ensuring that medications are dosed appropriately (or discontinued based on certain eGFR thresholds). It is important to be aware that certain ART medications will inhibit the proximal renal tubular secretion of creatinine which will modestly increase serum creatinine (usually by 0.1-0.2 mg/dL) without affecting eGFR. These medications include dolutegravir, bictegravir, rilpivirine, and the pharmacologic booster cobicistat (co-trimoxazole will also do this). For patients receiving any of these agents—if their eGFR is close to a clinically important threshold—it may be wise to calculate the eGFR based on their serum creatinine and again using a value that is 0.1-0.2 mg/dL lower, knowing that their true eGFR may lie between these values.

Once the eGFR is established for patients with renal impairment it is important to review medications and adjust dosing as needed. Below is a table of commonly used ART medications with dosing thresholds based on eGFR.

Medication	Adjustment in renal dysfunction per eGFR	Notes
Tenofovir DF	**Best to avoid once eGFR <50-60** >50: no adjustment 30-49: 300mg every 48hrs 10-29: 300mg twice weekly <10 not on hemodialysis: uncertain	Best to avoid once eGFR <50-60
Abacavir	No adjustment	
Lamivudine (3TC)	>30: no adjustment 15-29: 150mg x1 then 100mg daily 5-14: 150mg x1 then 50mg daily <5 of hemodialysis: 50mg x1 then 25mg daily	
Dolutegravir	No adjustment	
Efavirenz	No adjustment	
Nevirapine	No adjustment unless on hemodialysis	
Darunavir	No adjustment	
Lopinavir	No adjustment	
Ritonavir	No adjustment	

ACTIVITY 5

Within the scope of your health profession, describe how you would support a woman with HIV who has signs and symptoms of cervical cancer (IPE)

Neo is thought to have acute kidney injury due to her NSAID use. Her lamivudine dosing is changed until her eGFR increases above 30. Her clinicians are also worried about her vaginal bleeding and would like to evaluate this further.

- What are potential causes of vaginal bleeding in women after menopause?

- When vaginal bleeding is irregular or particularly heavy in pre-menopausal or peri-menopausal women, how does the differential diagnosis of vaginal bleeding change? How does HIV change your thinking around causes of vaginal bleeding?

Read the excerpt from the "Comprehensive Cervical Cancer Control (WHO)" document in Additional Learner Materials and then answer the following questions in your small groups.

- What other symptoms may a patient with cervical cancer describe?

- What role does your health profession play in supporting a patient who is presenting with signs and symptoms that may be cervical cancer?

ACTIVITY 6

List cancer screening strategies for PWH in your context

Cancer is much more likely to be successfully treated if it is detected early, before invading local structures or spreading to distant parts of the body. Some cancers can be detected early through various screening tests (diagnostic tests that can detect the presence of cancer—or pre-cancerous changes—before patients may report symptoms). Unfortunately, many screening tests are not widely available in sub-Saharan Africa due to costs or a shortage of trained personnel or equipment, which is a major barrier to health equity.

Cancer screening tests, however, are not perfect - they must be used on the correct at-risk population to be beneficial. In addition, cancer screening tests should only be performed if the results will lead to an intervention that lowers the risk of an undesirable outcome, such as an abnormal Pap smear test being followed up with excision or ablation of the lesion.

Below is a list of cancer screening tests. Spend 5 minutes discussing what may be available in your context.

Cancer	Screening test	Notes
Anal cancer*	Anal Pap smear	Has started to be recommended in resource rich settings for men with HIV who engage in receptive anal intercourse
Breast cancer	Mammography	Usually recommended for women starting around the age of 50
Cervical cancer*	Cervical Pap smear or visual inspection with acetic acid (VIA)	Annual screening is generally recommended for women with HIV around the time of HIV diagnosis even if in late teens or early 20s.
Colorectal cancer	Fecal occult blood test (FOBT), sigmoidoscopy, or colonoscopy	Usually recommended for men and women around the age of 50
Kaposi sarcoma	Full-body skin exam	Should be performed on PWH who have advanced HIV disease
Lung cancer	CT scan of the lungs	Now recommended in some resource rich settings for heavy smokers over the age of 50
Prostate cancer	Prostate specific antigen (PSA) blood test	Has a poor track record for preventing prostate cancer but can be used for high-risk men around the age of 55

*While not a screening test, the HPV vaccine—if available—is indicated for all adolescents and young adults with HIV (different countries may have different cutoffs for the maximum age that this can be given). HPV prevention through vaccination plays a vital role in prevention of anal and cervical cancer.

- Which screening tests are difficult to access that may be particularly useful in your context?

- What role can health care professionals play in advocating for tests that would be particularly beneficial in your context?

Conclusion

References/Resources

1. WHO. Diagnosis and Management of Type 2 Diabetes (HEARTS-D); 2020 (WHO/UCN/NCD/20.1). License: CC BY-NC-SA 3.0 IG.
2. Slama et al. Inaccuracy of hemoglobin A1c among HIV-infected men: effects of CD4 cell count, antiretroviral therapies and hematological parameters. JAC 2014; 69: 3360-3367.
3. Brown et al. Recommendations for evaluation and management of bone disease in HIV. CID 2015; 60: 1242-1251
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