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## **DSD beyond HIV treatment**

**Using simplified algorithms and DSD to improve hypertension (HTN) control in people living with HIV in Uganda**



# 2021 WHO recommendations for “when” and “who” for hypertension

## Frequency of assessment (“when”)

- Monthly follow up after initiation or change in HTN medications until patients reach target.
- Follow up every 3–6 months for people whose blood pressure is under control

## Treatment by non-physician professionals (“who”)

- Pharmacological treatment of HTN can be provided by non-physician professionals, e.g., pharmacists, nurses, clinical officers
  - Conditions: proper training, prescribing authority, specific management protocols and physician oversight.

# Hypertension guidance used in MJAP project and Uganda national programme

- Based on the WHO HEART packages
- Adopted a simplified one page protocol
- Gave Amlodipine, Valsartan and Hydrochlorothiazide
  - Procured from the Novartis Access program
- Chosen due to local availability, cost & efficacy
- Average cost was \$1 per patient per medicine per month
- WHO recommended Amlo/Telmi and SPC were costly
- Cost of production work suggests Amlo/telmi SPC could be manufactured for \$7 per patient per year

# Components of our adapted WHO HEARTS strategy

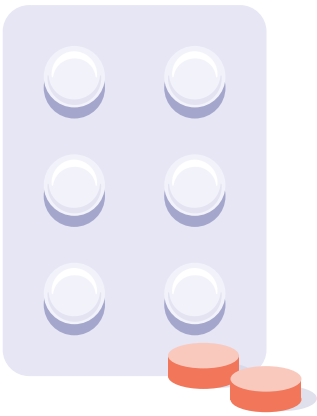
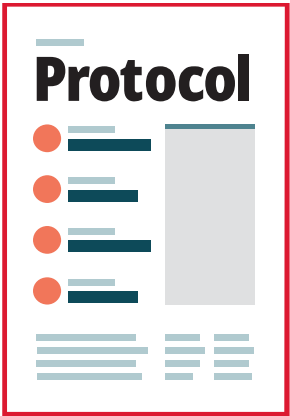
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***Adapted HTN treatment protocol***

***Free HTN medicines to patients***

***Task shifting of prescribing HTN medicines***

***BP screening by lay provider (PLHIV peer)***

***HTN registry***

# MJAP HTN protocol

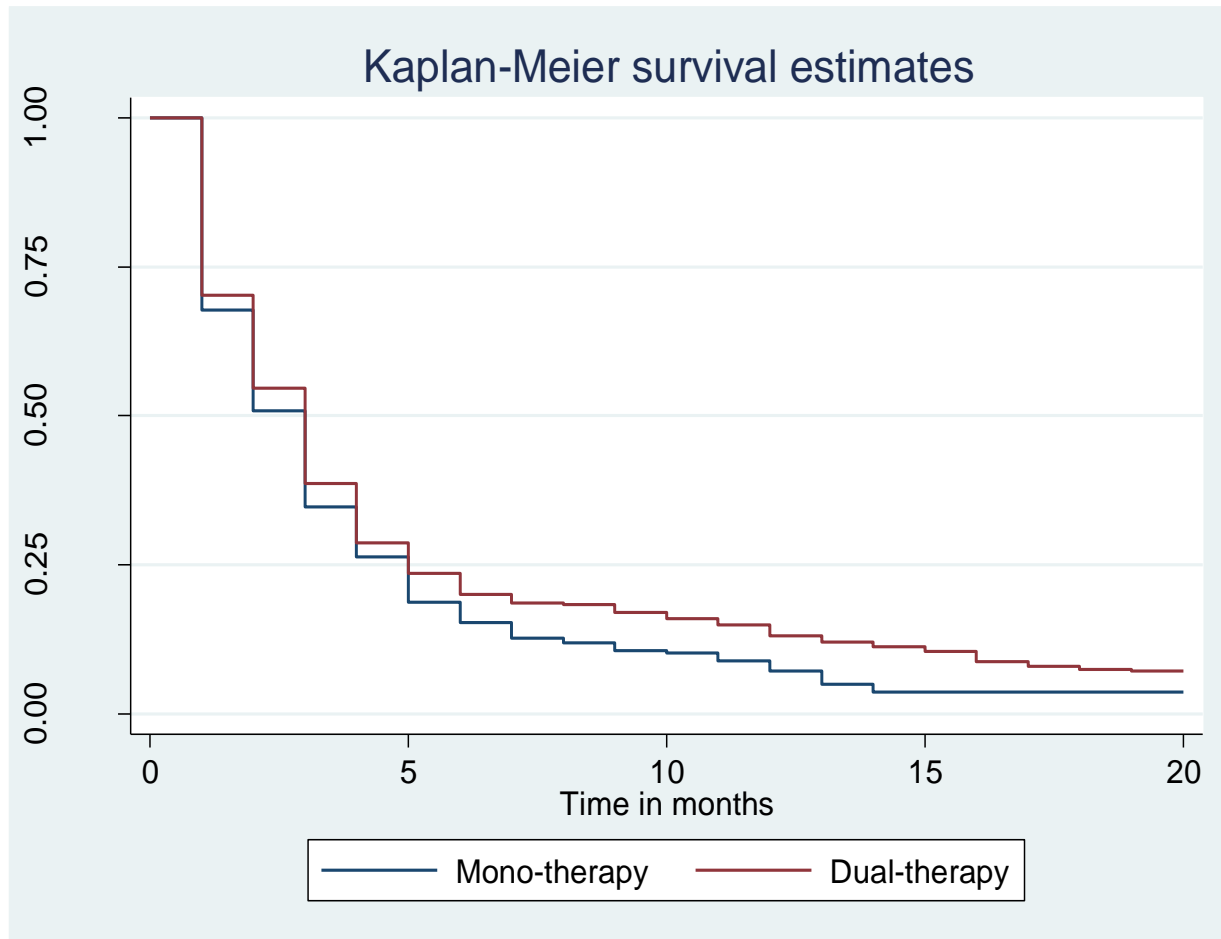
STEP <b>1</b>	<b>If BP <math>\geq 140</math> or <math>\geq 90</math> mmHg* Give amlodipine 5 mg.</b>
STEP <b>2</b>	<b>If BP is not controlled after one month, Add valsartan 80 mg on amlodipine 5 mg.</b>
STEP <b>3</b>	<b>If BP is not controlled after one month, Increase amlodipine to 10 mg on valsartan 80 mg.</b>
STEP <b>4</b>	<b>If BP is not controlled after one month, Increase valsartan to 160 mg on amlodipine 10 mg.</b>
STEP <b>5</b>	<b>If BP is not controlled after one month, Add hydrochlorothiazide 12.5 mg on amlodipine 10 mg and valsartan 160 mg.</b>
STEP <b>6</b>	<b>If BP is not controlled after one month, Assess adherence, continue medications, and refer to a specialist.</b>

**\*Start at STEP 2 if BP  $\geq 160/100$  mmHg.**

**All medicines are given once a day.**

**Assess and support adherence for both ART and antihypertensive treatment during each clinic visit.**

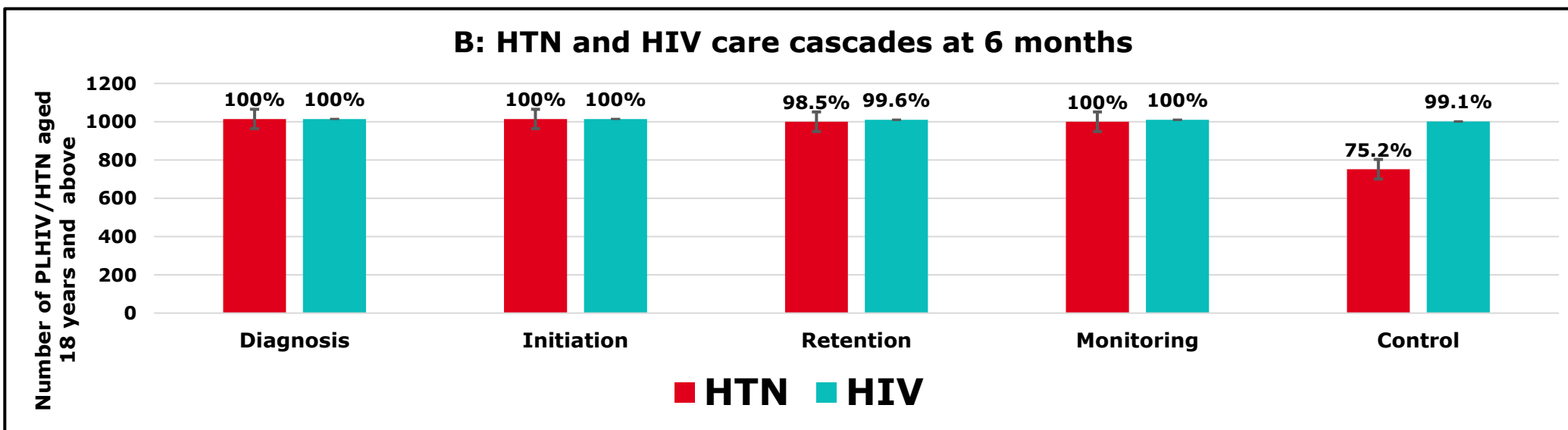
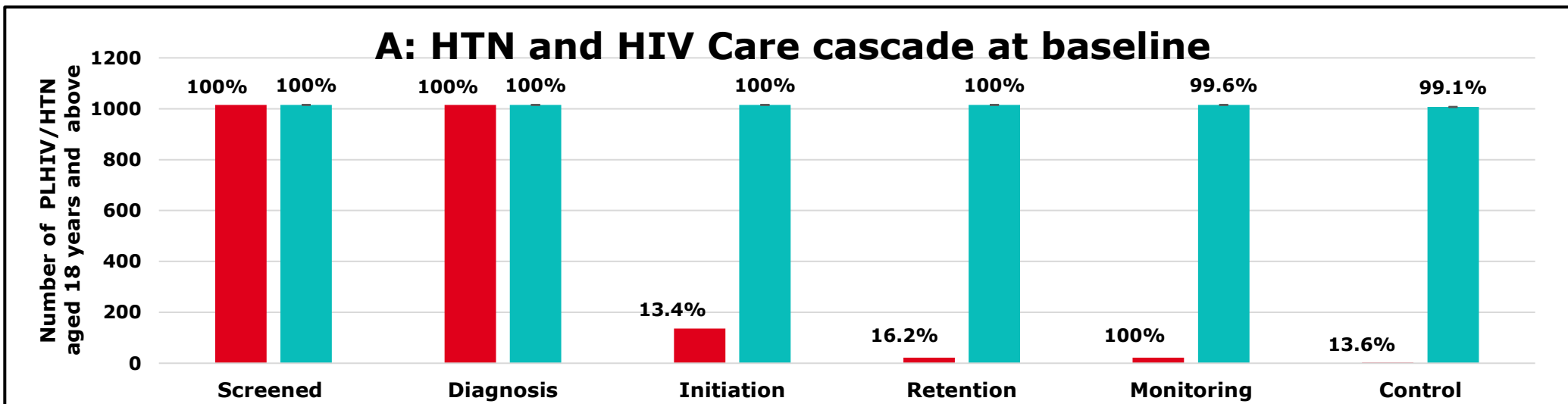
# Time to control of hypertension using the algorithm



- 877 people living with HIV with HTN
- Mean age 50.5 years
- 62.1% female
- HTN medicines:
  - ❖ *Amlodipine,*
  - ❖ *Valsartan,*
  - ❖ *Hydrochlorothiazide*



# HIV-HTN Care Cascades-HEARTS implementation in Uganda (N=1033)



1. Muddu, M., et al. (2023). Using the RE-AIM framework to evaluate the implementation and effectiveness of a WHO HEARTS-based intervention to integrate the management of hypertension into HIV care in Uganda: a process evaluation. *Implementation Science Communications*, 4(1).
2. Muddu, M., et al (2022). Improved hypertension control at six months using an adapted WHO HEARTS-based implementation strategy at a large urban HIV clinic in Uganda. *BMC Health Services Research*, 22(1).


# HTN and HIV outcomes at 21 months (N=1084)

Outcome variable	At baseline	At 21 months	P-value
% HTN control (BP <140/90mmHg)	54 (5%)	813 (75%)	<0.001
Mean systolic BP $\pm$ SD	153.9 $\pm$ 0.7	129.7 $\pm$ 0.9	<0.001
Mean diastolic BP $\pm$ SD	96.7 $\pm$ 0.5	85.1 $\pm$ 0.7	<0.001
%Viral load control	1,051 (97%)	1,073 (99%)	0.063



# Uganda HTN protocol: adopted from the MJAP protocol





THE REPUBLIC OF UGANDA  
MINISTRY OF HEALTH

## HYPERTENSION TREATMENT PROTOCOL FOR UGANDA

**STEP 1** Screen all clients for hypertension during each clinic visit. If BP  $\geq 140$  or  $\geq 90$ . Offer lifestyle modification for 3 months.

**STEP 2** IF still  $\geq 140$  or  $\geq 90$  PRESCRIBE starting dose of CCB: Amlodipine 5mg once daily  
*After 1 month*

**STEP 3** IF still  $\geq 140$  or  $\geq 90$ . ADD starting dose of ARB: Amlodipine 5mg + Losartan 50mg (or Valsartan 80mg or Telmisartan 40mg) once daily  
*After 1 month*

**STEP 4** IF still  $\geq 140$  or  $\geq 90$ . INCREASE to full dose of CCB: Amlodipine 10mg + Losartan 50mg (or Valsartan 80mg or Telmisartan 40mg) once daily  
*After 1 month*

**STEP 5** IF still  $\geq 140$  or  $\geq 90$ . INCREASE to full dose of ARB: Amlodipine 10mg + Losartan 100mg (or Valsartan 160mg or Telmisartan 80mg) once daily  
*After 1 month*

**STEP 6** IF still  $\geq 140$  or  $\geq 90$ . ADD thiazide diuretic: Amlodipine 10mg + Losartan 100mg (or Valsartan 160mg or Telmisartan 80mg) + Hydrochlorothiazide 12.5mg once daily  
*After 1 month*

**STEP 7** CONFIRM that the patient has been taking the medications regularly and correctly. If so, refer the patient to a higher level of care.

NOTE  
 \* If BP  $\geq 160/100$  mmHg, Start at STEP 3  
 † Assess and support adherence for antihypertensive treatment during each clinic visit and advise patients to continue lifestyle modification with medicines  
 ‡ Instead of ARB, you can use Angiotensin Converting Enzyme inhibitors like Lisinopril and Enalapril

Class	Medication	Starting dose	Maximum dose
CCB (calcium channel blocker)	Amlodipine	5mg	10mg
	Losartan	50mg	100mg
	Valsartan	80mg	160mg
ARB (Angiotensin receptor blocker)	Telmisartan	40mg	80mg
	Enalapril	5mg	10mg
	Lisinopril	20mg	40mg
ACE (angiotensin converting-enzyme inhibitor)	Ramipril	5mg	10mg
	Hydrochlorothiazide	12.5mg	25mg
Diuretic (thiazide)	Bendroflumethiazide	2.5mg	5mg

**PROVISION FOR SPECIFIC PATIENTS**

- Assess the cardiovascular risk in all patients with hypertension.
- Patients with diabetes, coronary heart disease, stroke or chronic kidney disease are considered high cardiovascular risk.
- The goal of BP is  $<130/80$  mmHg in people with high cardiovascular risk.
- Manage diabetes as indicated by the Uganda clinical guidelines.
- Start statin (Atorvastatin 40 mg once daily or Simvastatin 20-40 mg once daily) and cardiac Aspirin 75mg once daily in people with prior heart attack or ischemic stroke. Consider statin in people at high CVD risk.
- Start beta blocker in people with heart attack in past 3 years.
- A combination of ACE/ARB and a CCB or a diuretic is recommended as initial therapy in patients with Chronic kidney disease.


**PRECAUTIONS**

- Diuretics: can produce hypokalemia and can have adverse effects on lipid and glucose values.
- The use of calcium channel blockers can cause molecular edema in up to 10% of patients, especially at high doses, if an ACE inhibitor or an ARB is not being used.
- ACE inhibitor: They carry a small risk of angioedema; the risk is greater in people of African descent (not observed with ARBs).
- ACE inhibitors (and ARBs) should not be given to women who pregnant or may become pregnant.
- Risk of hyperkalemia, particularly if the patient has a chronic kidney disease.
- Monitor potassium and kidney function when starting or changing dose of ACE/ARB or thiazide/thiazide-like diuretic, if testing is readily available and does not delay treatment.

**LIFESTYLE MODIFICATION**

At each step of hypertension management;

- Increase physical activity/exercise regularly to equivalent of brisk walk 150 -minutes per week.
- Stop tobacco use, and avoid second-hand smoke
- Decrease alcohol consumption
- If overweight/obese, BMI  $> 25$ , lose weight
- Eat a healthy diet:
  - Consume less than a teaspoon of salt a day.
  - Do not add extra salt to cooked food
  - Eat fewer processed foods.
  - Eat a low-fat, balanced diet – including plenty of fresh fruit and vegetables
  - Use healthy oils (e.g. olive, safflower).
  - Eat nuts, legumes, whole grains
  - Eat high-potassium foods, like avocados, bananas, dried fruits, tomatoes, and black beans
  - Limit red meat to once or twice a week at most
  - Eat fish or other foods rich in omega-3 fatty acids at least twice a week
  - Avoid added sugar from cakes, cookies, sweets, fizzy drinks and juice.



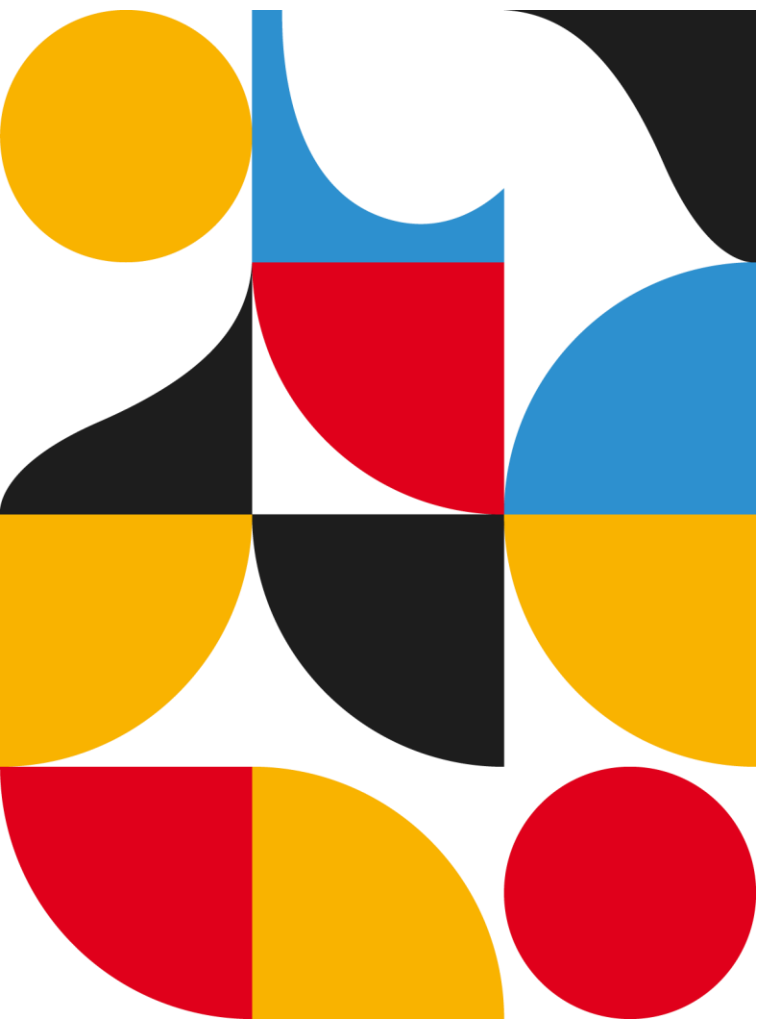
This protocol is based on the recommendations of the HEARTS technical package for cardiovascular disease management in primary health care and the WHO guidelines for the pharmacological treatment of hypertension in adults

Based on:

- Amlodipine,
- ARBs and
- Thiazides

*Separate pills*

# Eligibility criteria for DSD model for clients established on treatment



Criteria for established on treatment	HIV	Hypertension
<b>Duration of treatment</b>	On ART for at least 6 months	On HTN treatment for at least 3 months
<b>Health status</b>	No current illness	Clinically well
<b>Chronic conditions</b>	Controlled chronic conditions	Controlled chronic conditions
<b>Adherence</b>	Good adherence	Good adherence
<b>Treatment success</b>	Viral load < 200 copies/ml	BP < 140/90mmHg
<b>Drug toxicity</b>	No ART limiting toxicity	No HTN medicine toxicity

# Uganda building blocks



	<b>HIV</b>		<b>Hypertension</b>	
	Clinical visit	Refill-only visit	Clinical visit	Refill-only visit
<b>WHEN</b>	Once a year	3 – 6 monthly	6-monthly	3 – 6 monthly
<b>WHO</b>	Clinician Nurse	Nurse Community health worker Peer	Clinician Nurse	Nurse Community health worker Peer
<b>WHERE</b>	Health facility	Community Health facility	Health facility	Community Health facility
<b>WHAT</b>	Viral load test Clinical assessment	Refill only	BP monitoring Clinical assessment	Refill only

# Outcomes of integrated MMD for ART and HTN medications

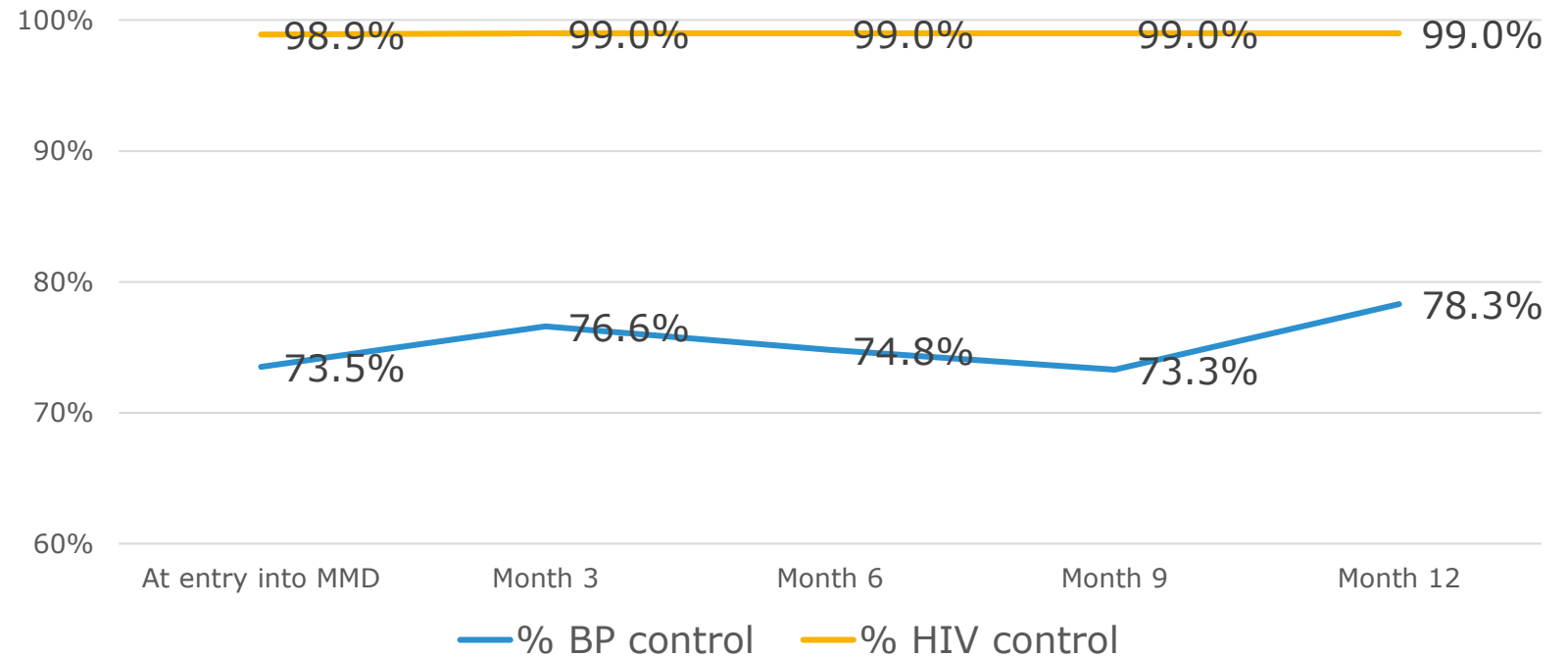
•Mean age: 51 years  
(SD = 9)

•Average time to MMD: 2 months

•Retention in care: 96.4%

•Adverse drug reactions: 1.4%

### Longitudinal trend of HTN and HIV control



“The treatment of HTN helped us to reduce the costs and the time we could take moving from one place to another accessing treatment. It saved us from attending the HIV clinic on one day and then a HTN clinic the following week”  
***-Person living with HIV and hypertension, focus group discussant***

Muddu, M., et al. (2023). Using the RE-AIM framework to evaluate the implementation and effectiveness of a WHO HEARTS-based intervention to integrate the management of hypertension into HIV care in Uganda: a process evaluation. *Implementation Science Communications*, 4(1)

# Conclusions and lessons learned

- Leveraging existing HIV structures is key to integration of non-communicable diseases (NCDs)
- DSD for NCDs for people living with HIV is feasible but requires access to NCD medicines
- Sustainable integration requires policy guidelines (WHO and national)



# Acknowledgements

- Uganda MoH
- International AIDS Society (IAS)
- PEPFAR team
- The NIH (FIC and NHLBI)
- Makerere University Joint AIDS Program (MJAP)
- Infectious Diseases Research Collaboration (IDRC)
- Resolve to Save Lives
- Uganda Heart Institute (UHI)
- PULESA Uganda team