



cira

Center for Interdisciplinary Research on AIDS  
at Yale University

# ***CIRA Talk: "Integrating Hypertension Screening and Treatment into HIV Care in Uganda"***

**Wednesday, March 29, 2023**

**10:00 am – 11:00 am Eastern**

**5:00 pm – 6:00 pm Kampala**

Welcome! This event will start momentarily.

Today's seminar is being recorded for future viewing.

Presentation slides and recording will be available at CIRA website.



The screenshot shows the CIRA website homepage. At the top, there's a navigation bar with 'Yale University' on the left and 'Portal | Calendar | A-Z Index' on the right. Below this is the CIRA logo and name: 'cira Center for Interdisciplinary Research on AIDS'. A search bar is on the right. A main navigation menu includes 'About', 'People', 'Research', 'News', 'Opportunities', 'Training', and 'Implementation Science'. A featured article on the left is titled 'Report: Federal ruling on HIV prevention 'misreads the science'' and discusses a new report co-authored by experts from Yale. To the right, there's a 'CIRA eBulletin' sign-up form. Below the featured article, there's a section 'In the Spotlight' with three articles: 'YSPH professors present on Russian war crimes at United Nations', 'Black and women scientists are less likely to have multiple research grants', and 'APNH: A Place to Nourish your Health representing at The White House'. On the right side, there are sections for 'Upcoming CIRA Events' (listing events for March 28 and 29, 2023), 'Funding Opportunities' (with a link to download an Excel spreadsheet), and 'Recent Publications by CIRA Affiliates' (listing a publication in PLoS One).

Yale University Portal | Calendar | A-Z Index

**cira**  
Center for Interdisciplinary Research on AIDS

About People Research News Opportunities Training Implementation Science

**Report: Federal ruling on HIV prevention 'misreads the science'**  
A new report co-authored by experts from Yale and elsewhere challenges a 2022 federal court ruling that it is unconstitutional to mandate employer-sponsored insurance coverage for drugs that help prevent HIV.

**more news »**

**In the Spotlight**

**YSPH professors present on Russian war crimes at United Nations**  
On the day before the anniversary of the Russian invasion of Ukraine, Kaveh Khoshnood (CIRA affiliate and co-chair of HIV/AIDS in Humanitarian Crises Program) and Nathaniel Raymond brought their findings on Russian war crimes to the United Nations. More from...

**Black and women scientists are less likely to have multiple research grants**  
A growing number of researchers have more than two grants simultaneously from the National Institutes of Health (NIH), but women and Black researchers are less likely than white men to be among them, a new Yale study finds. This disparity, the researchers say, has...

**APNH: A Place to Nourish your Health representing at The White House**  
Tim Mack, Prevention Services Manager at APNH (APNH: A Place to Nourish your Health) and founder of the annual New Haven Black Pride event, was recently invited to the White House to be part of the LGBTQIA+ Black History Month briefing where participants learned...

**more news »**

**Upcoming CIRA Events**

**Tue, March 28, 2023 | 12:00 pm-1:00 pm**  
YSPH Department of Social and Behavioral Sciences and CIRA Spring 2023 Seminar Series: Kimberly Sue, MD, PhD

**Wed, March 29, 2023 | 10:00 am-11:00 am**  
CIRA Talk: "Integrating Hypertension Screening and Treatment into HIV Care in Uganda"

**Funding Opportunities**

**Download an Excel spreadsheet compilation of active funding opportunities.** Selected opportunities are listed below.

**Harold Amos Medical Faculty Development Program**  
Application Due Date: March 15, 2023

**2023 Culture of Health Prize**  
Application Due Date: March 29, 2023

**Multi-Level HIV Prevention Interventions for**

**Recent Publications by CIRA Affiliates**

**Autonomy-supportive sexual health communication and sexual health behaviors for black and Latino MSM in the House Ball Community: Protocol for a social network analysis and exploratory structural equation model**  
Martez D R Smith, Natalie M Leblanc, LaRon E Nelson, James M McMahon  
PLoS One. 2023. Feb 3;18(2):e0276350. doi: 10.1371/journal.pone.0276350. eCollection 2023.

Visit <https://cira.yale.edu/>

- CIRA eBulletin (monthly)
- CIRA Cores
- Affiliated Individuals
- Affiliated Research Projects
- Events
- Archived Recordings
- Peer Review
- Pilot Projects
- Training Programs
- Job Listings
- Implementation Science Resources
- International Research
- HIV/AIDS in Humanitarian Crises

# Calendar of Events

## **YSPH SBS and CIRA Seminar: "Mass Incarceration as a Sociostructural Determinant of Health for LGBTQ+ Populations"**

Tuesday, April 11, 2023, 12:00 pm-1:00 pm Eastern

Speaker: Tyler Harvey, MPH (SEICHE Center for Health and Justice, Yale School of Medicine)

Zoom link: <https://yale.zoom.us/j/95017104878>

## **YSPH SBS and CIRA Seminar: "Using Virtual Environments to Improve Cardiovascular Health among Individuals Living with HIV"**

Tuesday, April 18, 2023, 12:00 pm-1:00 pm Eastern

Speaker: S. Raquel Ramos, PhD, MBA, MSN, FNP, FNYAM (Yale School of Nursing)

Zoom link: <https://yale.zoom.us/j/95017104878>

## **CIRA Talk: "Sankofa 1 and 2 - Implementation Research to Optimize Disclosure of HIV Status to Children in Ghana"**

Wednesday, April 19, 2023, 1:00 pm-2:00 pm Eastern

Speakers: Elijah Paintsil, FAAP, MD (Yale Schools of Public Health and Medicine) and Nancy Reynolds, PhD, MS, RN, FAAN, C-NP (Johns Hopkins School of Nursing)

Zoom registration: <https://bit.ly/3TX5oo4>

# Logistics

**The presentation will  
be followed by  
a discussion and  
a Q&A session.**

**Use the Chat function  
to submit questions  
and comments.**

**Share your feedback in  
a brief survey to  
inform future events  
and activities.**

# CIRA Talk: “Integrating Hypertension Screening and Treatment into HIV Care in Uganda”



*Speaker*

Martin Muddu, MBChB, MMed,  
PhD Candidate  
Makerere University and  
Infectious Diseases Research Collaboration



*Discussant*

Saria Hassan, MD, MPH  
Emory University School of Medicine



*Moderator*

Luke Davis, MD, MAS  
Yale School of Public Health,  
Yale School of Medicine, CIRA



# Integrating Hypertension Screening and Treatment into HIV Care in Uganda

Martin Muddu (MBChB, MMed)

PhD Candidate at Makerere University, Uganda

March 16, 2023



# Outline

- Epidemiology of HTN among Persons living with HIV (PLHIV)
- Designing and Evaluating an implementation strategy for HTN care in HIV clinics in Uganda
- Integrating HTN care with community-based models of ART delivery

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# The burden of hypertension in HIV in Uganda

Total population of Uganda: ~45 million people

- **Prevalence of HIV: 5.3%**
- **Known status 81%**
- **On HIV treatment (ART) 96%**
- **PLHIV with controlled HIV 92%**

- **Prevalence of HTN in PLHIV: 24%**
- **HTN awareness 7%**
- **On HTN treatment 20%**
- **PLHIV with controlled HTN 5%**

# Hypertension in the general population, Uganda

- Prevalence of hypertension: 23-29%
- Awareness of hypertension: 7-20%
- Hypertension control: 5-8%



# The rationale for HTN-HIV integration

- HIV is a risk factor for cardiovascular disease including HTN
- HTN is a major risk factor for ischemic heart disease, stroke and CKD
- WHO and MoH HIV guidelines recommend HTN-HIV integration
- WHO HEARTS guidelines promote HTN management in LMICs

# WHO HEARTS components



**Healthy-lifestyle  
counselling**



**Evidence-based  
treatment  
protocols**



**Access to  
essential  
medicines and  
technology**



**Risk-based CVD  
management**



**Team-based  
care**



**Systems for  
monitoring**

# Outline

- Epidemiology of HTN among Persons living with HIV (PLHIV)
- Designing and Evaluating an implementation strategy for HTN care in HIV clinics in Uganda
- Integrating HTN care with community-based models of ART delivery

# Objectives of the study

- To map the integrated cascades of care for HTN and HIV in Uganda
- To understand barriers and facilitators of integrated HTN-HIV care
- To adapt the WHO HEARTS guideline to integrate HTN and HIV care

# Mapping the care cascades for HTN and HIV

Muddu *et al.* *Implementation Science Communications*  
<https://doi.org/10.1186/s43058-021-00223-9>

(2021) 2:121


Implementation Science  
Communications

RESEARCH

Open Access

## Hypertension care cascade at a large urban HIV clinic in Uganda: a mixed methods study using the Capability, Opportunity, Motivation for Behavior change (COM-B) model



Martin Muddu<sup>1,2†</sup>, Isaac Ssinabulya<sup>2,3,4</sup>, Simon P. Kigozi<sup>5</sup>, Rebecca Ssenyonjo<sup>1</sup>, Florence Ayebare<sup>6</sup>, Rodgers Katwesigye<sup>1</sup>, Mary Mbuliro<sup>1</sup>, Isaac Kimera<sup>1</sup>, Chris T. Longenecker<sup>7</sup>, Moses R. Kamya<sup>1,2,3,5</sup>, Jeremy I. Schwartz<sup>2,8</sup>, Anne R. Katahoire<sup>6</sup> and Fred C. Semitala<sup>1,3,5\*†</sup> 

## Methods

Study design

Retrospective

Setting

1 large HIV clinic (15,953 adult PLHIV)

Duration

12 months

Outcomes

HTN&HIV cascade indicators

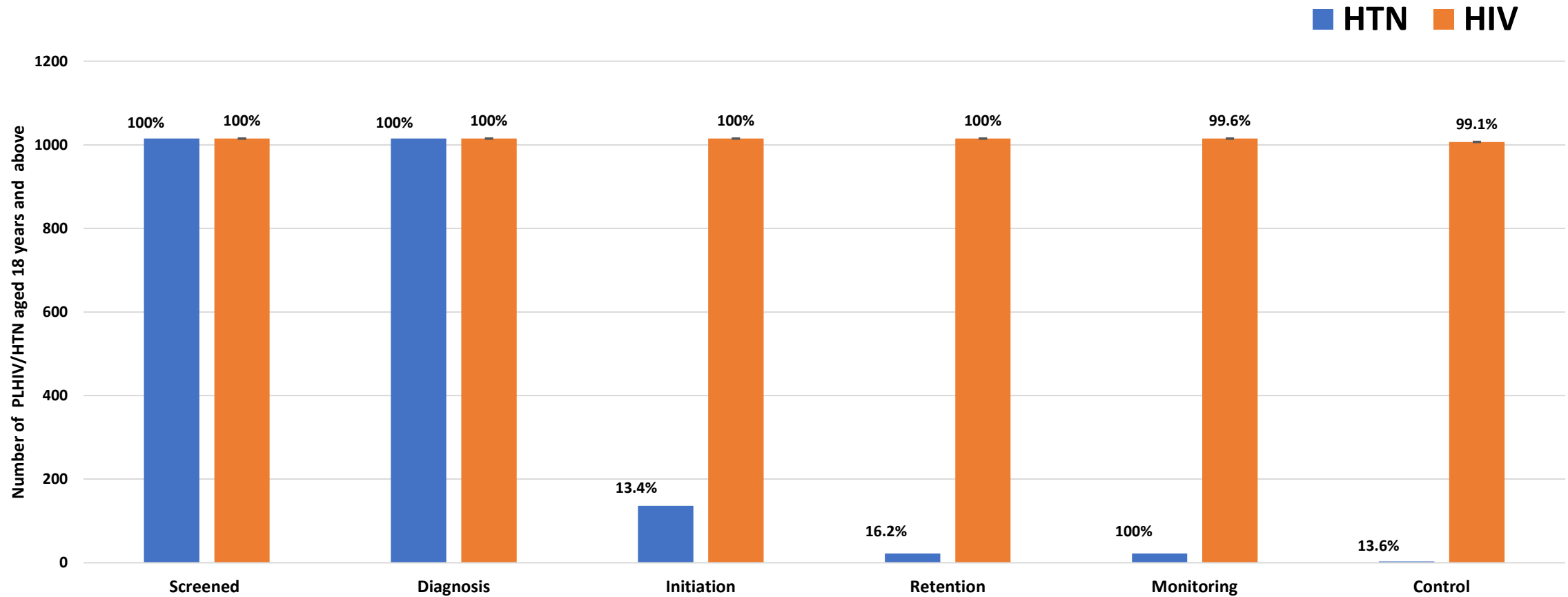
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# Study population and characteristics

- PLHIV with HTN
- CD4, VL, Age, social demographics

# Baseline HTN-HIV cascade



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# Exploring barriers and facilitators to integrated hypertension-HIV management in Ugandan HIV clinics using the Consolidated Framework for Implementation Research (CFIR)



Martin Muddu<sup>1,2,3\*</sup>, Andrew K. Tusubira<sup>2</sup>, Brenda Nakirya<sup>2</sup>, Rita Nalwoga<sup>2</sup>, Fred C. Semitala<sup>1,3</sup>, Ann R. Akiteng<sup>2</sup>, Jeremy I. Schwartz<sup>2,4</sup> and Isaac Ssinabulya<sup>1,2,5</sup>

Methods	
Study design	Qualitative
Setting	Three HIV clinics
Methods	In-depth interviews and FGDs
Sample size	12 PLHIV with HTN (IDIs)
	11 health care providers
	PLHIV with HTN (6 FGDs)
Analysis	Thematic
Theoretical framework	CFIR

# Barriers and facilitators mapped onto the CFIR

- Include the CFIR figure with the results mapped onto it

# Barriers to HTN-HIV integration

- Poor Access to HTN medicines
- Lack of evidence-based treatment protocols for HTN
- Lack of monitoring & evaluation tools for HTN
- Providers had low knowledge and skills of HTN management

# Provider's experiences with HTN services

*The top most of things is medicine, drugs, drugs, drugs. We are doing well regarding ART, even our HIV viral suppression is at 97%. ...but for HTN, we have done nothing. It is beyond our control, we can't buy HTN medicines, we just prescribe and encourage our clients to go and buy. (In-depth interview, healthcare provider, HIV clinic)*

# Facilitators for HTN-HIV integration

- HTN screening at triage (registration desk)
- HIV electronic medical records (EMR) system
- Existing HIV clinics
- Patients' and providers' enthusiasm for integration



*A nurse measuring BP at Mulago ISS clinic, Kampala*



# Developing the implementation strategy

- A multidisciplinary team
  - HIV healthcare providers (clinicians, nurses, pharmacists, laboratory tech, counselors, data team, patient representatives)
  - Cardiologists
  - Uganda MoH experts at NCDs department and AIDS Control Program
  - PEPFAR teams
- Based on the barriers and facilitators
- Adapted the WHO HEARTS strategy
- Used a shareholder engaged design

# Components of our adapted WHO HEARTS strategy

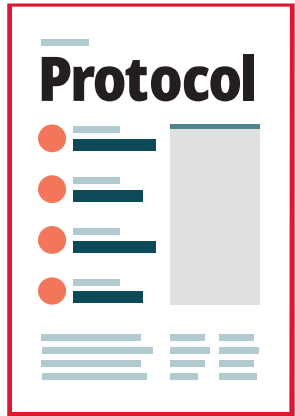
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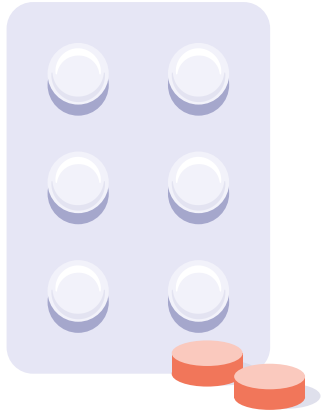
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*Adapted HTN  
treatment  
protocol*



*Free HTN  
medicines to  
patients*



*Task shifting of  
prescribing  
HTN medicines*



*BP screening  
by lay provider  
(PLHIV peer)*



*HTN registry*

# Selecting HTN medicines for our protocol

*The NEW ENGLAND JOURNAL of MEDICINE*

ORIGINAL ARTICLE

## Comparison of Dual Therapies for Lowering Blood Pressure in Black Africans

D.B. Ojji, B. Mayosi,\* V. Francis, M. Badri, V. Cornelius, W. Smythe, N. Kramer,  
F. Barasa, A. Damasceno, A. Dzudie, E. Jones, C. Mondo, O. Ogah, E. Ogola,  
M.U. Sani, G.L. Shedul, G. Shedul, B. Rayner, I.G. Okpechi, K. Sliwa,  
and N. Poulter, for the CREOLE Study Investigators†

Group 1

Group 2

Group 3

Amlodipine  
+  
Perindopril

Amlodipine  
+  
Hydrochlorothiazide

Perindopril  
+  
Hydrochlorothiazide

Both **Group 1** and **Group 2** had lower 24hr ambulatory systolic BP than **Group 3**.

There were no significant differences in BP between **Group 1** and **Group 2**.

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

\*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.

## Our hypertension treatment protocol

# Mulago ISS clinic (16,500 PLHIV)



Nurse  
prescribing HTN  
medicines using  
the protocol

RESEARCH

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# Improved hypertension control at six months using an adapted WHO HEARTS-based implementation strategy at a large urban HIV clinic in Uganda

Martin Muddu<sup>1\*</sup>, Fred C. Semitala<sup>2</sup>, Isaac Kimera<sup>1</sup>, Mary Mbuliro<sup>1</sup>, Rebecca Ssenyonjo<sup>1</sup>, Simon P. Kigozi<sup>3</sup>, Rodgers Katwesigye<sup>1</sup>, Florence Ayebare<sup>2</sup>, Christabellah Namugenyi<sup>1</sup>, Frank Mugabe<sup>4</sup>, Gerald Mutungi<sup>4</sup>, Chris T. Longenecker<sup>5</sup>, Anne R. Katahoire<sup>2</sup>, Isaac Ssinabulya<sup>6</sup> and Jeremy I. Schwartz<sup>7</sup>

## Methods

Study design      Single arm pre-post study

Population        Adult PLHIV with HTN receiving integrated HTN/HIV care

Sample size       1084 PLHIV with HTN

Follow up         21 months

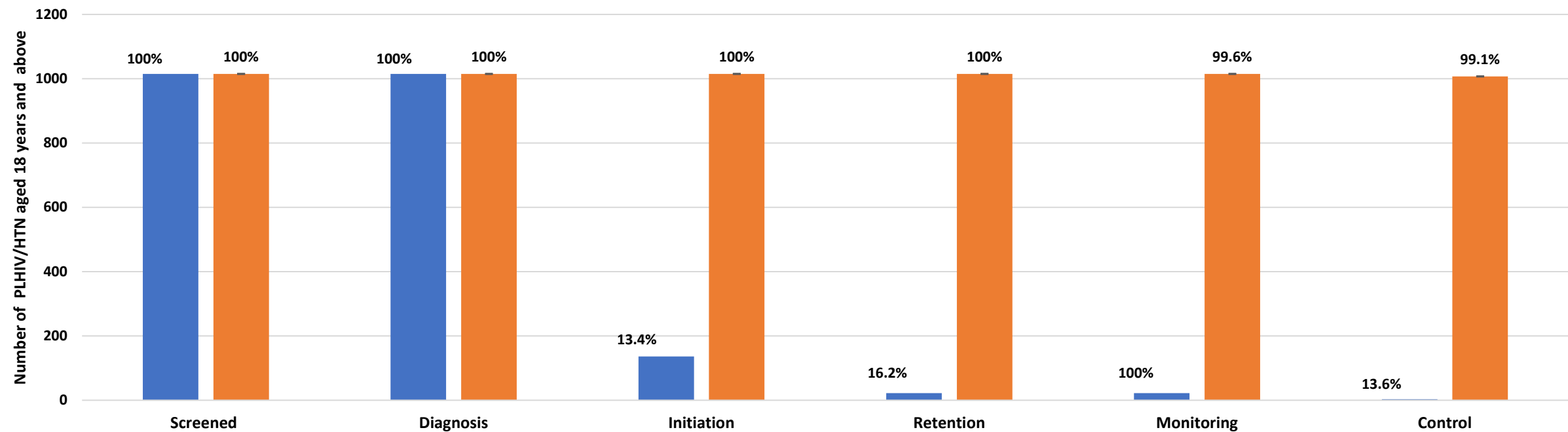
Outcomes         Primary: Number (%) patients with BP, <140/90mmHG  
Secondary: Mean BP, HIV Viral suppression, Cascades



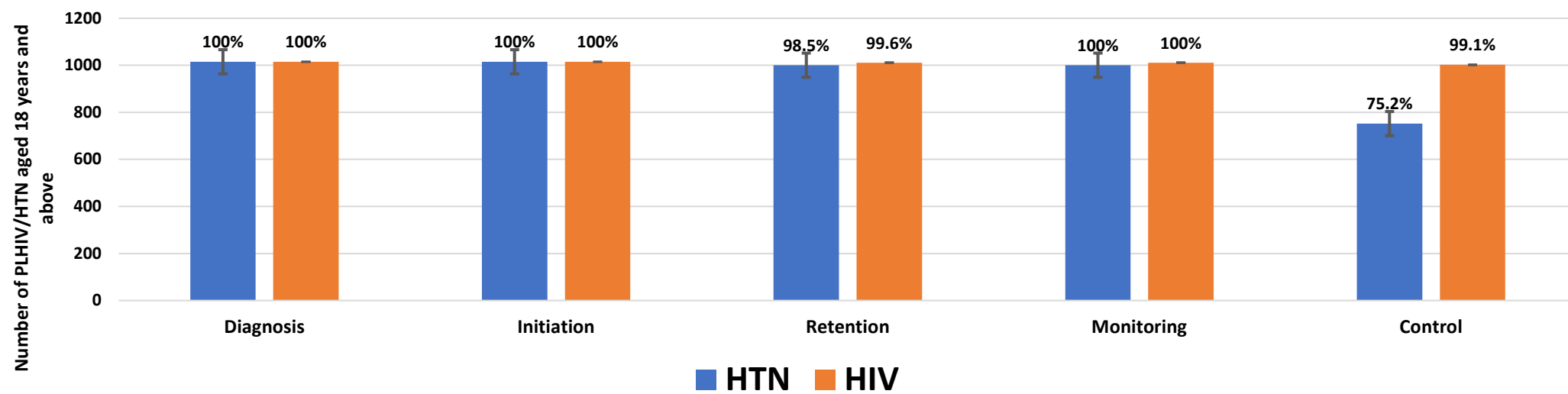
# Study population and characteristics

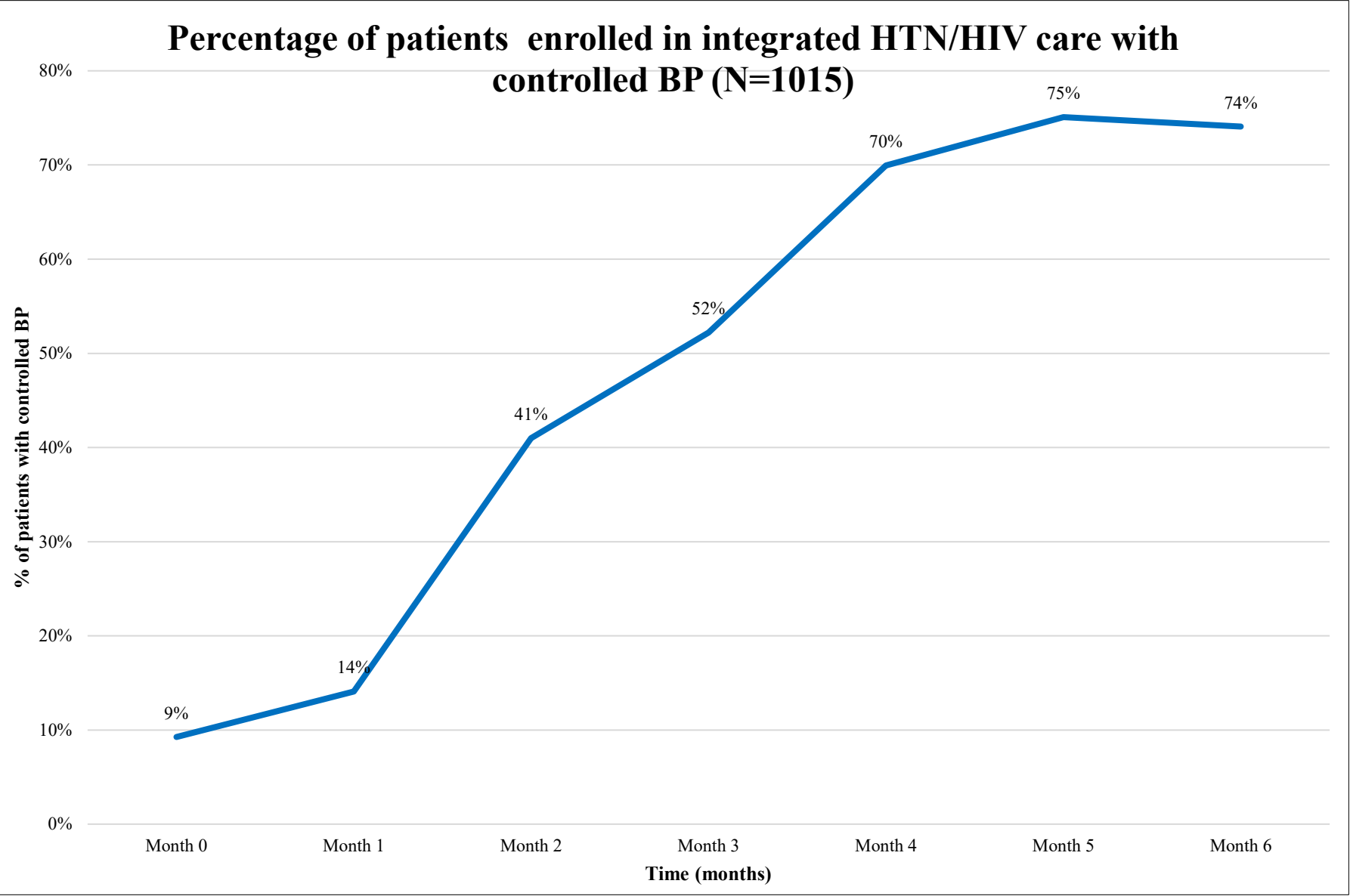
- PLHIV with HTN
- CD4, VL, Age, social demographics

A: HTN and HIV Care cascade at baseline



B: HTN and HIV care cascades at 6 months

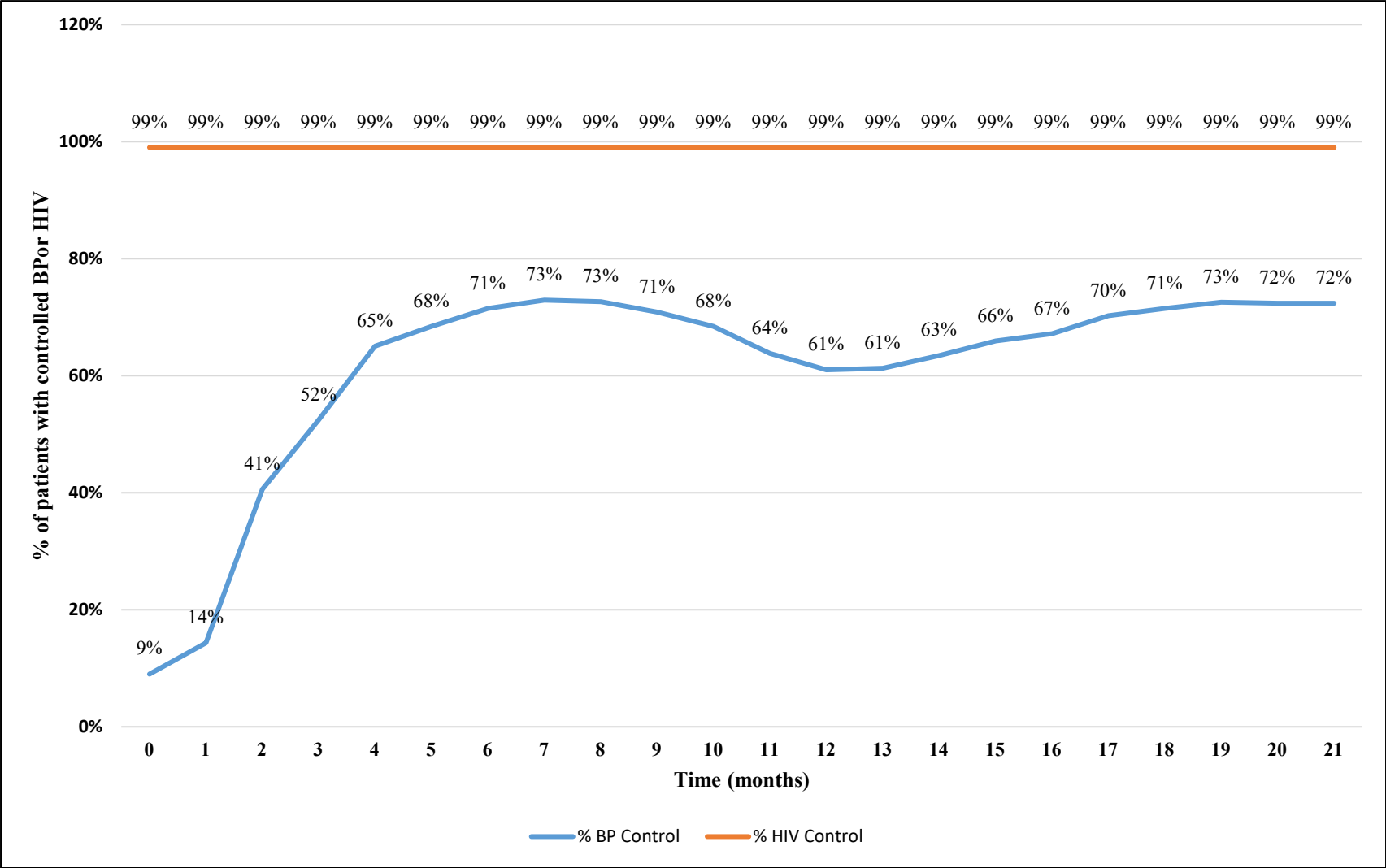




# HTN and HIV outcomes at 21 months (N=1084)

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

# % of patients enrolled in integrated HTN/HIV care with controlled BP and suppressed HIV viral load (N=1084)



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# Emerging Global Leader Award – K43

Goal:

*To design evidence-based implementation strategies to integrate the management of hypertension into existing community models of HIV care in Uganda and evaluate their effectiveness and implementation*

# Over 40% of PLHIV receive ART in the community



Integrated HTN-HIV care should be available in the community as well

*PEPFAR partner meeting, Kampala, Feb 2016, Uganda MoH DSD working group 2023*

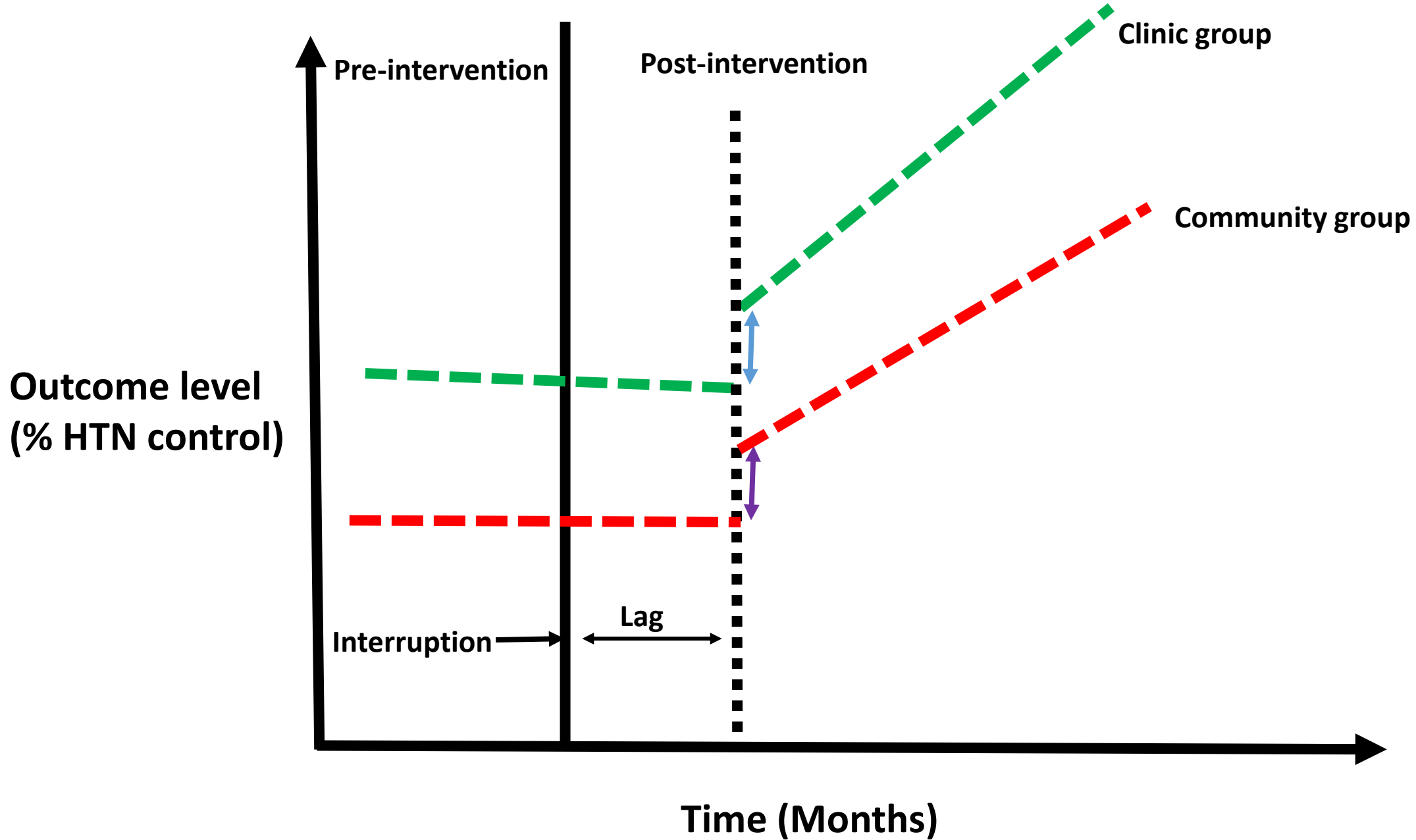


# Objectives

1. Explore stakeholder views on adding HTN care to community ART models
2. To design strategies to integrate HTN and HIV care in the community
3. To determine the effectiveness of the implementation strategies
4. To evaluate the implementation outcomes of the strategies

# Status of implementation

- We are finalizing the study protocol
- For IRB review in April 2023



**Figure 7: Predicted impact model for Hypertension control**

# Take home messages

- The burden of hypertension among PLHIV is high
- HIV and HTN services are largely vertically oriented
- Integration of HTN/HIV services at the health facility is feasible
- Our ongoing research is to study HTN/HIV integration in the community

Thank you for listening

# Acknowledgments

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## Mentors

- Prof. Moses R. Kamya
- Dr. J. Lucian Davis

## Co-mentors

- Prof. Anne R. Katahoire
- Prof. Noah Kiwanuka

## Collaborators:

- Dr. Fred Semitala
- Dr. Isaac Ssinabulya
- Dr. Jeremy Schwartz

Uganda MoH

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GHES fellowship (Yale and Makerere University)

PEPFAR team

Makerere University Joint AIDS Program (MJAP)

Infectious Diseases Research Collaboration (IDRC)

Resolve to Save Lives

Uganda Heart Institute (UHI)