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Integrating Hypertension Screening at Voluntary HIV Testing among Adults in South Africa

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BACKGROUND

- Cardiovascular disease (CVD) is a leading cause of mortality worldwide, and a leading cause of HIV/AIDS-related mortality.
- The World Health Organization (WHO) and others recommend blood pressure screening at HIV diagnosis in order to integrate management of HIV and chronic NCDs.
- Since both hypertension and HIV infection are risk factors for cardiovascular diseases (CVD), guidance is needed for how to best integrate hypertension screening and treatment within HIV testing and care.

OBJECTIVE

- To understand the association between HIV infection and hypertension among South African adults accessing HIV testing services in a poor urban township. Since hypertension screening routinely occurs after HIV testing, the goal of this study was to determine if blood pressure measurements and hypertension screening are dynamic around the time of HIV testing in South Africa.

METHODS

- Prospective study of adults (≥18 years) presenting for voluntary HIV counseling and testing in the outpatient department of the iThembalabantu People's Hope Clinic (IPHC) in the Umlazi township of South Africa from Sept 2013 to April 2017.
- Participants completed questionnaire on drug/alcohol use, general anxiety using the standardized GAD-7 scale, and depression using the PHQ-9 scale.
- Following at least 10 minutes of rest, a research assistant obtained a resting, seated blood pressure measurement using a standardized digital blood pressure machine.
- All participants were tested for HIV infection using a rapid test by an HIV counselor.
- Among HIV-infected participants, a research nurse obtained anthropometric measurements using standard procedures. At the end of the clinical visit and after at least 10 minutes of rest, another seated blood pressure measurement was obtained.
- **Primary Outcome** was hypertension, and we used the defined categories from the Seventh Joint National Committee (JNC 7), which are also supported by current WHO and CDC hypertension guidelines.
- We use "hypertension" to refer to a participant having either stage 1 or stage 2 hypertension.
- We calculated mean arterial blood pressure (MAP) as [(2*diastolic)+systolic]/3].

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RESULTS

Table 1. Cohort Characteristics (N=5,428).

	N	*(%)*
Demographics		
Age (mean ±S.D.)	31.0	±10
Female	2,681	(49)
Socioeconomic		
Never Married	4,991	(92)
>=1 child	3,725	(69)
Unemployment	3,252	(60)
Income < US $150/month	4,427	(82)
Food Insecure	533	(10)
Mental Health		
Anxiety (GAD-7 score >=10)	1,444	(27)
Depression (PHQ-9 score >=15)	336	(6)
Substance Use		
Cigarette (within last month)	1,216	(22)
Alcohol (within last month)	1,878	(35)
IV Drug Use (ever)	53	(1)
Cannabis	349	(6)
HIV Status		
HIV+	1,905	(35)

Table 2. Mean blood pressure and prevalence of hypertension by HIV status (N=5,428).

	HIV- (n=3,523)	HIV+ (n=1,905)	p-value	HIV+ CD4 ≤200 (n=500)	HIV+ CD4 >200 (n=1,102)	p-value
	Mean ±SD or N (%)	Mean ±SD or N (%)		Mean ±SD or N (%)	Mean ±SD or N (%)	
Blood Pressure (mmHg)						
Systolic blood pressure	118 ±15	116 ±16	**<0.0001**	115 ± 17	117 ± 15	**0.0076**
Diastolic blood pressure	73 ±15	71 ±18	**<0.0001**	70 ± 18	71 ± 18	0.2396
Mean arterial BP	88 ±13	86 ±14	**<0.0001**	85 ± 15	86 ± 14	**0.0499**
Hypertension						
Normal blood pressure	1650 (45.3)	984 (49.7)		258 (51.6)	548 (49.7)	
Prehypertension	1489 (40.9)	736 (37.2)	**0.0044**	205 (41)	436 (39.6)	0.0818
Stage 1 Hypertension	289 (7.9)	130 (6.6)		23 (4.6)	90 (8.2)	
Stage 2 Hypertension	95 (2.6)	55 (2.8)		14 (2.8)	28 (2.5)	

Table 3. Baseline characteristics and hypertension among ALL participants. (N=5,428).

	Adjusted OR (95% CI)	p-value
Age (years)		**<.0001**
18-24	-	-
25-34	1.83 (1.42 ,2.35)	
35-44	2.88 (2.16 ,3.84)	
≥45	5.14 (3.83 ,6.89)	
Anxiety		**0.0001**
No (GAD-7 score <10)	-	-
Yes (GAD-7 score ≥10)	1.47 (1.21 ,1.79)	
Alcohol use		**0.0066**
Never used	-	
Some use, but not within last month	1.55 (1.08 ,2.21)	
Used within last month	1.28 (1.06 ,1.54)	
HIV status		**0.0003**
Negative	-	
Positive	0.70 (0.57, 0.85)	

Table 4. Baseline characteristics and hypertension among HIV+.

	Adjusted OR (95% CI)	p-value
Age (years)		**<.0001**
18-24	-	
25-34	1.45 (0.80 - 2.60)	
35-44	2.70 (1.48 - 4.94)	
≥45	3.91 (2.03 - 7.52)	
Anxiety		**0.010**
No (GAD-7 score <10)	-	-
Yes (GAD-7 score ≥10)	1.56 (1.11 - 2.18)	
CD4 count		**0.004**
≤ 200 cells/mm^3	-	
> 200 cells/mm^3	1.78 (1.20, 2.64)	

KEY POINTS

- In this cross-sectional study of ART-naïve South African adults, 10.2% had either stage 1 or 2 hypertension. Major risk factors included age, anxiety, alcohol use, and HIV-status.
- HIV infection and immunosuppression (CD4 ≤200 cells/mm^3) were associated with significantly lower baseline rates of hypertension, when adjusted for other contributing factors.
- Importantly, HIV-positive adults experienced a significant transient increase in blood pressure after receiving an HIV+ test result (data not shown).

STRENGTHS & LIMITATIONS

- Major strengths included a large sample size allowing more robust analyses of covariates for hypertension and before/after HIV testing, stratifying results by relative immunosuppression, and adjusting multivariable model for important risk factors, such as anxiety.
- Limitations included obtaining only one blood pressure measurement at each time point, which is not consistent with AHA guidelines since one measure may result in misclassification.

CONCLUSIONS

- **Untreated HIV-infected adults, and particularly immunocompromised adults, have lower baseline rates of hypertension compared to HIV-negative adults, and that blood pressure transiently increases after receiving a positive HIV test result.**
- **Since hypertension screening may be dynamic around the time of HIV testing, our findings do not support measuring blood pressure following HIV testing during the same clinical visit.**
- **Instead, hypertension screening should ideally occur before HIV testing, be repeated again after ART initiation and viral load suppression, and be continued at regular intervals.**