Sex Differences in the Effect of Hypertension on Stroke Risk in the REasons for Geographic and Racial Differences in Stroke Study

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Sex and Gender
in Emergency Medicine

Disclosures

I have no disclosures.

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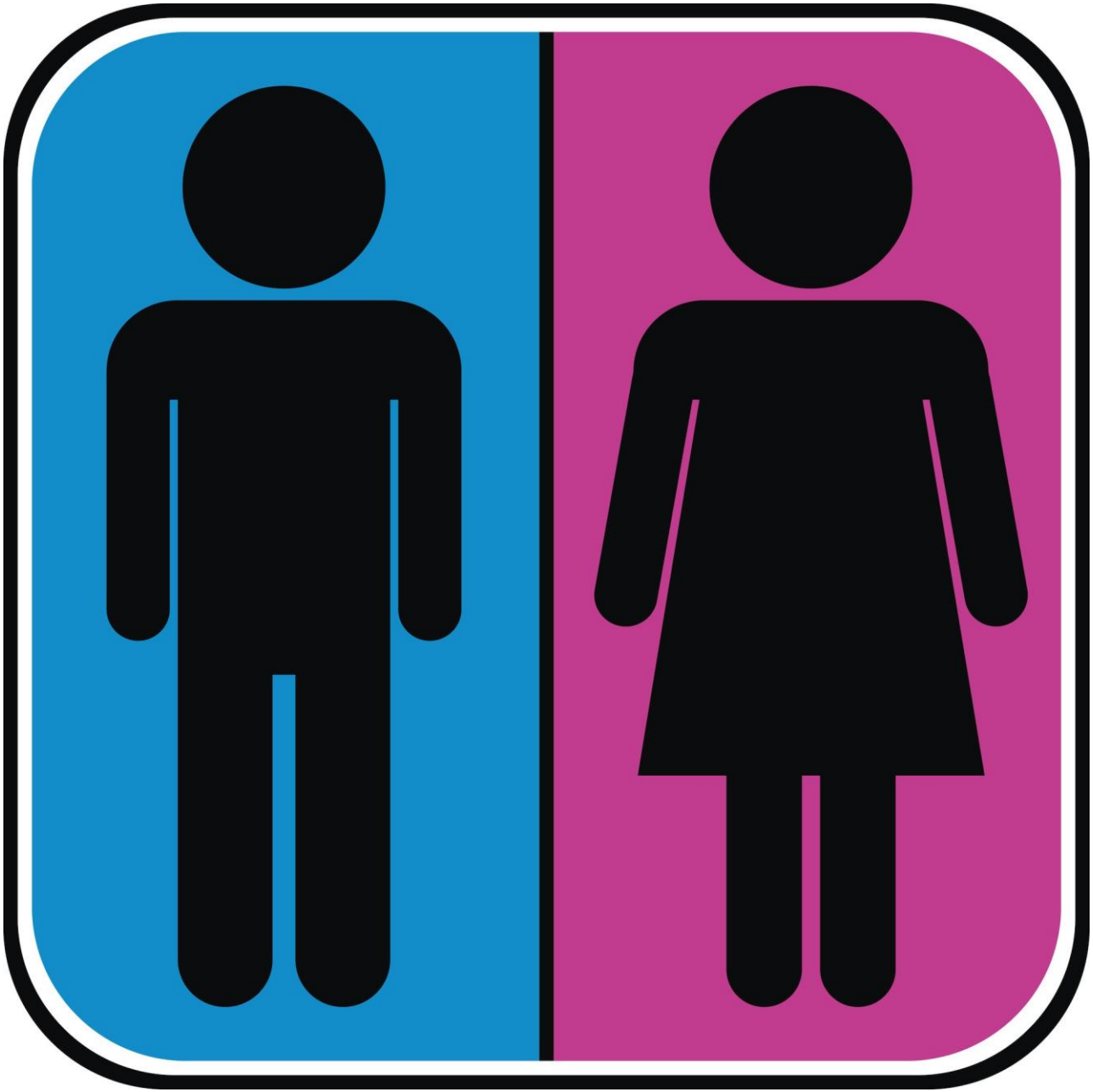


Table 1

Sex Differences in Risk Factor Prevalence, Associations, and Treatment Disparities, Women Compared with Men

Risk Factor	Prevalence	Association with IS	Treatment Disparity
Hypertension	Lower in women (vs. men) in younger age groups, higher in older age groups	Similar in women (vs. men) in younger age groups, higher in older age groups	In younger age groups, women more likely to have BP controlled; in older age groups, women less likely to have BP controlled.
Dyslipidemia	Data conflict; either similar between sexes or lower in women	Lower in women	Women less likely to be on statins and have LDL controlled.
Atrial Fibrillation	Higher in women	Higher in women	Women less likely to be prescribed oral anticoagulants, less likely to have cardiac ablation, and receive lower doses of NOACs.
Migraine	Higher in women	Higher in women.	Unknown if migraine treatment reduces stroke risk.
Diabetes	Similar women vs. men	Higher in women	Data conflict regarding sex differences in meeting HbA1c goal
Cognitive Impairment	Higher in women	Unknown whether there is a sex difference	Women less likely to be treated with anti-dementia drugs

IS: Ischemic stroke. BP: blood pressure. NOAC: novel oral anticoagulant. HbA1c: glycated hemoglobin

Madsen TE, Howard VJ, Jimenez M, et al. Impact of Conventional Risk Factors on Stroke in Women: An Update. *Stroke*. [In press]

Sex and Gender Differences

Prevalence

Association with Stroke Risk

Treatment/ Control

Age

Race

Ethnicity

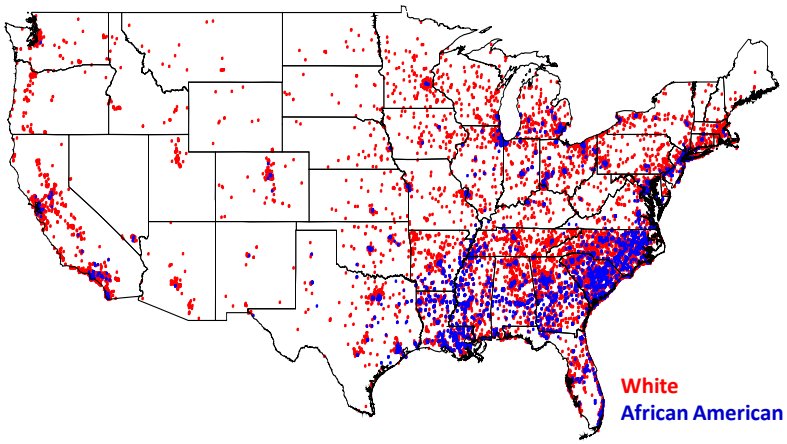
Sex-specific Treatment goals?

Objective

- We sought to determine if there are sex differences in the association of severity of hypertension (HTN) or treatment of HTN with the risk of ischemic stroke.

Methods

- We used data from the REGARDS study, a national longitudinal cohort of 30,239 adults at least 45 years old, recruited between 2003 and 2007.



N = 30,239

Methods

- Only participants free of stroke at baseline were included
- Baseline data were collected using a combination of computer assisted telephone interview (age, race, anti-hypertensive medications) and in-home measurements (systolic blood pressure)
- Physician-adjudicated ischemic stroke events ascertained at 6-month intervals

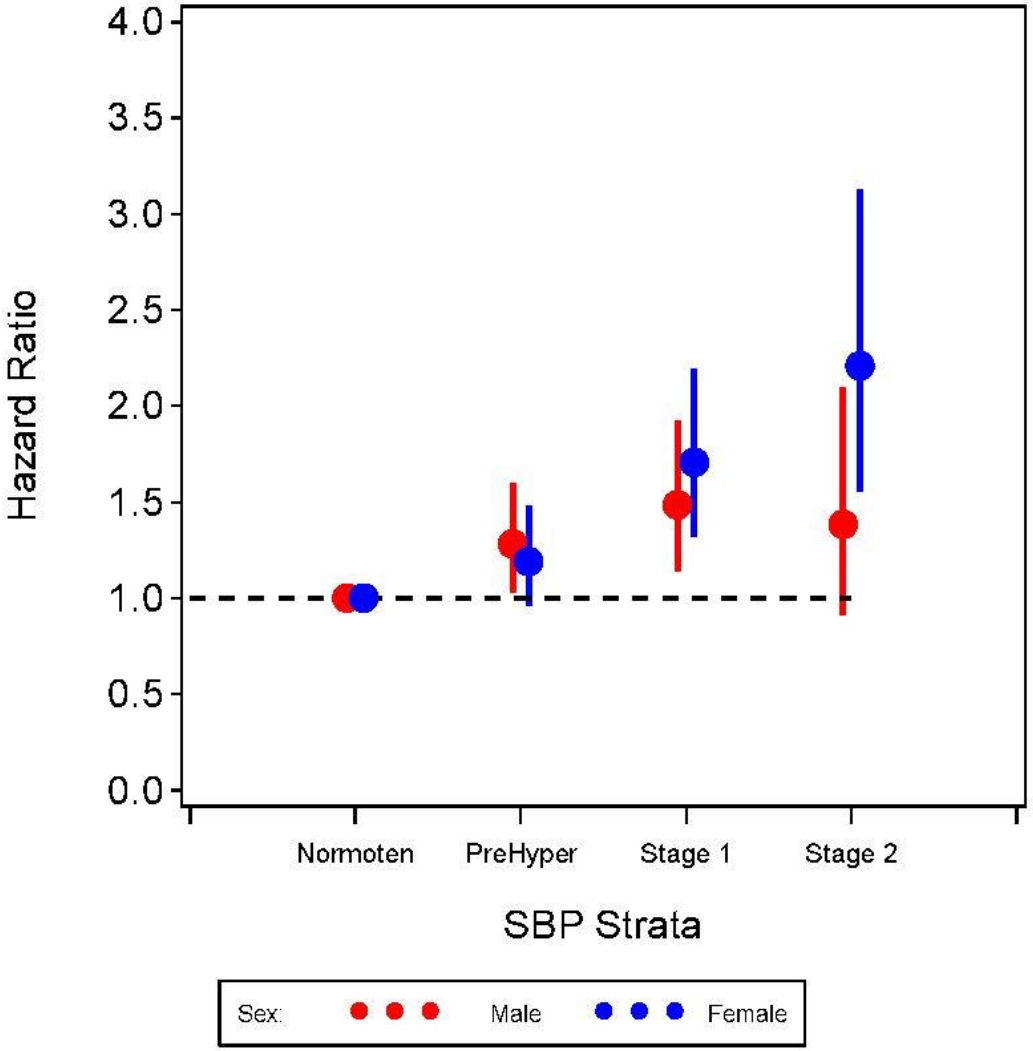
Methods

- Proportional hazards regression used to assess sex-specific association of SBP and the number of anti-hypertensives with ischemic stroke
- Hypertension analyzed as both categorical (Pre-HTN, Stage 1 HTN, Stage 2 HTN) and continuous
- Analyses conducted in full sample, then stratified by race

Results

- 1084 ischemic stroke events among 26,461 participants
- Average follow-up 8.7 years
- 55.4% women, 40.2% black

Sex-specific Associations Between Systolic Blood Pressure and Ischemic Stroke



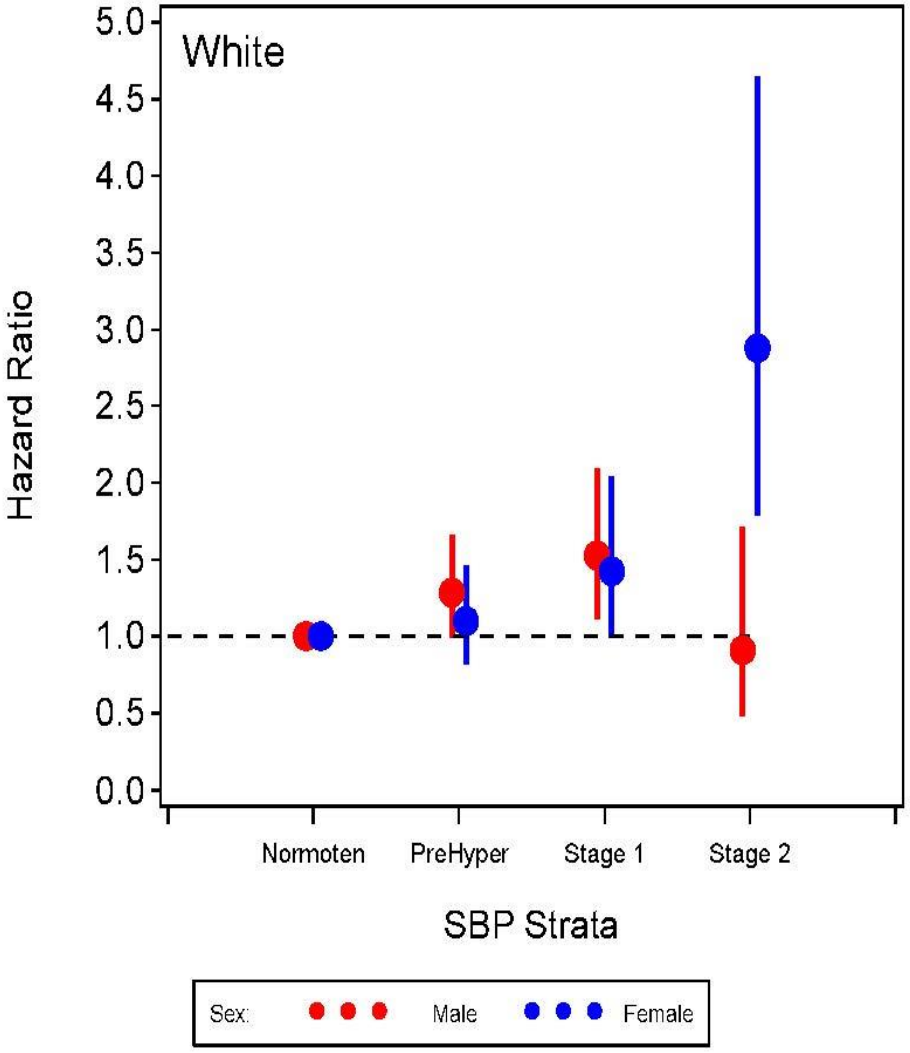
Increased risk per level of HTN:
Women:
1.32, 95% CI 1.19 - 1.46
Men:
1.16, 95%CI 1.04 – 1.29

Increased risk per 10 mm Hg increase in SBP:
Women:
1.15 95% CI 1.10 - 1.20
Men:
1.08 95% CI 1.03 - 1.14

P=0.087

*Adjusted for age, race, age-by-race product term, anti-hypertensives

Sex-specific Associations Between Systolic Blood Pressure and Ischemic Stroke, White Participants



Increased risk per level of HTN:

Women:

1.32, 95% CI 1.14 - 1.52

Men:

1.12, 95%CI 0.99 – 1.28

Increased risk per 10 mm Hg increase in SBP:

Women:

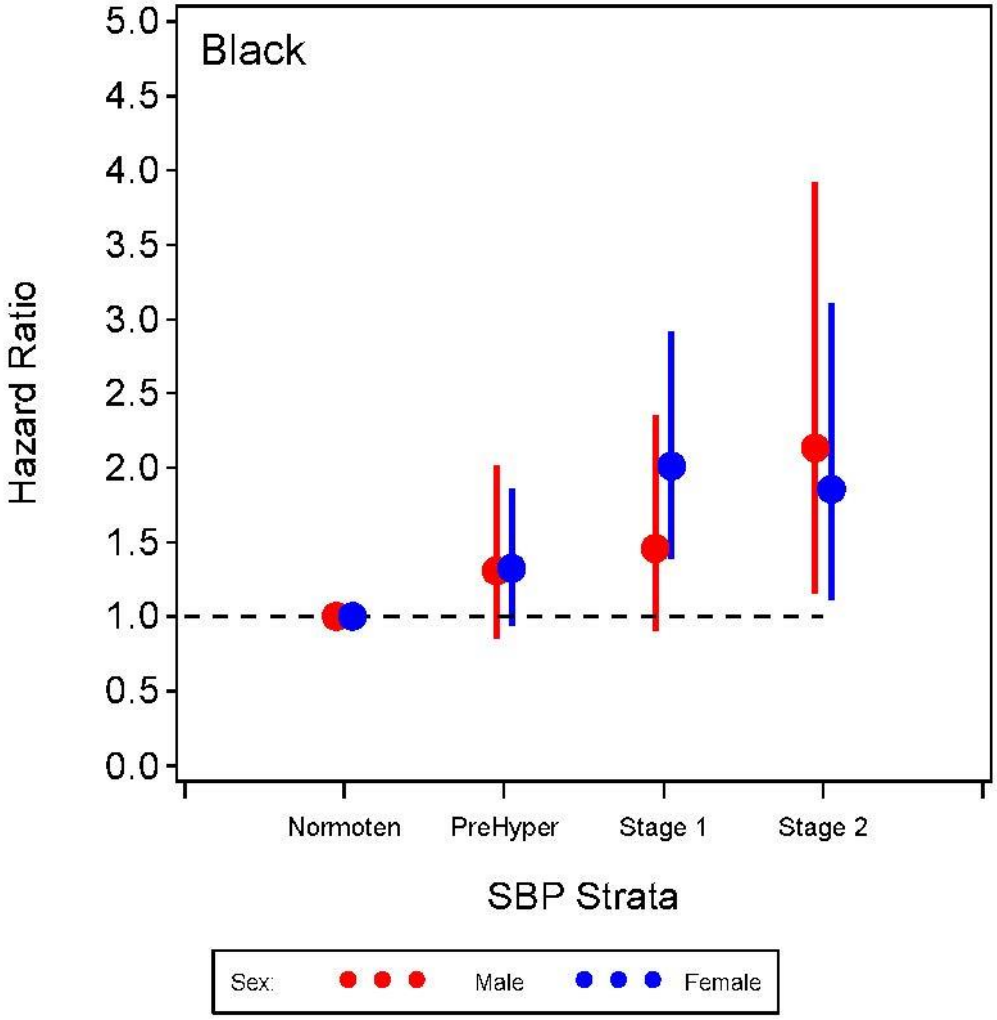
1.14 95% CI 1.07 - 1.22

Men:

1.06 95% CI 0.99 - 1.13

P=0.093

Sex-specific Associations Between Systolic Blood Pressure and Ischemic Stroke, Black Participants



Increased risk per level of HTN:

Women:

1.31, 95% CI 1.14 - 1.50

Men:

1.24, 95%CI 1.04 – 1.48

Increased risk per 10 mm Hg increase in SBP:

Women:

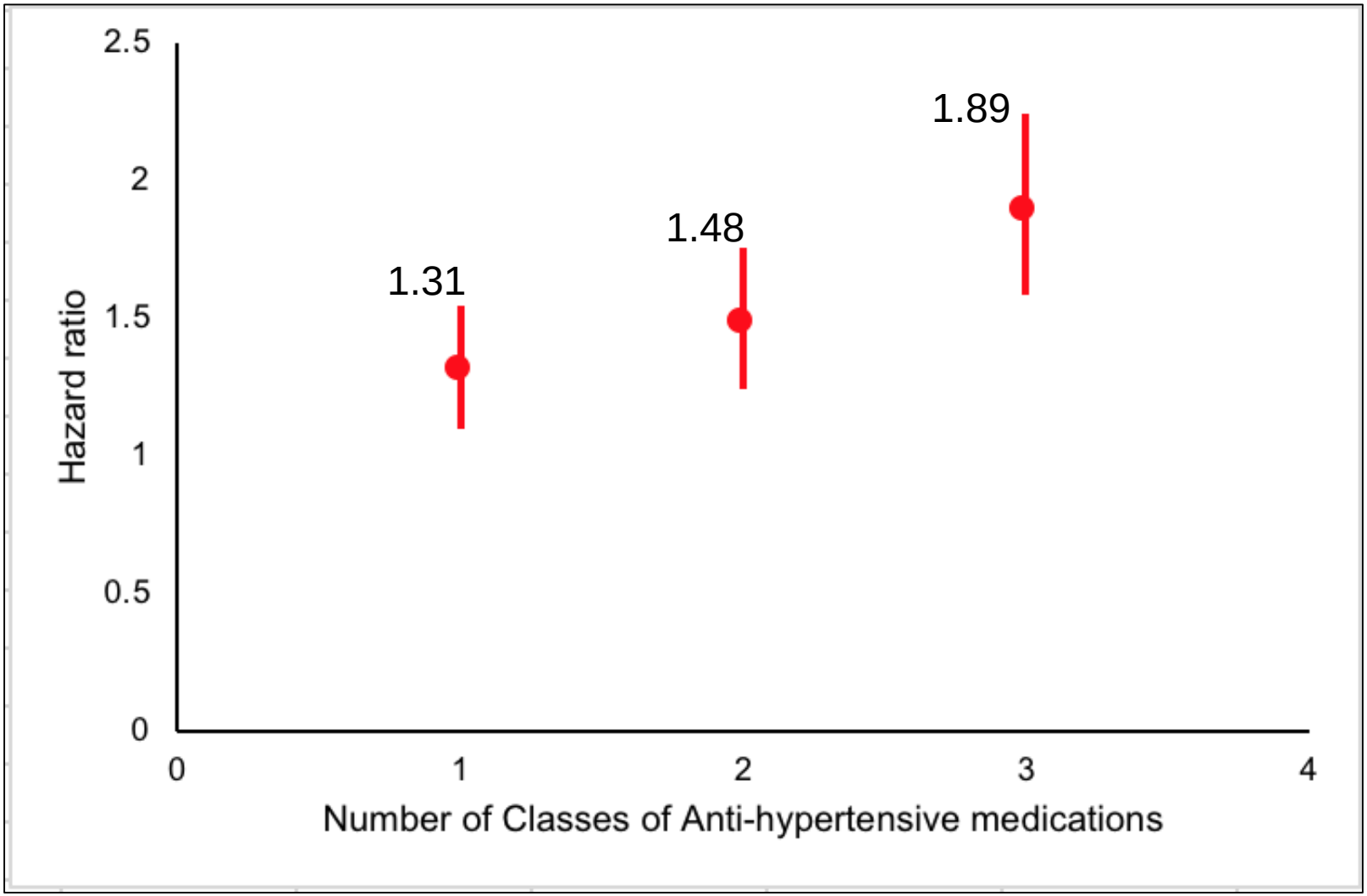
1.15 95% CI 1.04 - 1.24

Men:

1.13 95% CI 1.04 - 1.24

P=0.79

Association Between Anti-hypertensive Medications and Incident Ischemic Stroke



Discussion

- The risk of ischemic stroke with increasing severity of hypertension appears to be about twice as great in women compared with men
- Though medication use is an important additional risk factor, it does not explain the sex differences in risk associated with HTN severity
- Sex differences are more apparent among white participants than black participants

Future Directions

- Confirm whether there are similar sex differences in the association between ischemic stroke and hypertension using new ACC/AHA guidelines
- Further investigations on the biological mechanisms for sex differences in HTN
  - Closer investigation of age, hormones
- Are sex-specific clinical guidelines for HTN warranted?

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THANK YOU

Comparison to Previous Data

Study Description	Authors	Finding
1) Meta-analysis	Peters et al., Stroke, 2013	Similar impact of hypertension on stroke risk in women and men
2) Data analysis from CALIBER (electronic heath record dataset from UK)	Rapsomaniki et al., Lancet 2014	Similar impact of hypertension on stroke risk in women and men