Women on Antihypertensive Treatment Achieve Higher Rates of Blood Pressure Control Early in Treatment Than Men

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Key Findings:

- Women are 10.7% more likely than men to reach a systolic blood pressure (SBP) below 130 mmHg after one month of antihypertensive treatment, and 9.5% more likely to reach a SBP below 130 mmHg after three months.
- In the three years after the start of treatment, women are 4.3% less likely to experience a stroke and a 23.8% less likely to have an ASCVD event compared to men.

Hypertension, or high blood pressure, remains a leading modifiable risk factor for cardiovascular disease and stroke.[1] Previous research has shown that women and men have differences in baseline blood pressure and adverse outcome risk.[2,3]

To understand the differences in overall effectiveness of antihypertensive treatment by sex, we studied non-pregnant adult patients who started treatment for hypertension and had a baseline systolic blood pressure (SBP) greater than 130 mmHg, which is considered hypertensive.[4] We factored patient demographics, baseline blood pressure, comorbidities, prior medication use, and smoking status into our analysis.

One month into treatment, women were 10.7% more likely to achieve blood pressure control (SBP under 130 mmHg) compared to men, as seen in Figure 1. This difference persisted at three months, albeit slightly reduced, with women 9.5% more likely to achieve an SBP under 130mmHg than men.

Women's Likelihood of Achieving Blood Pressure Control Compared to Men

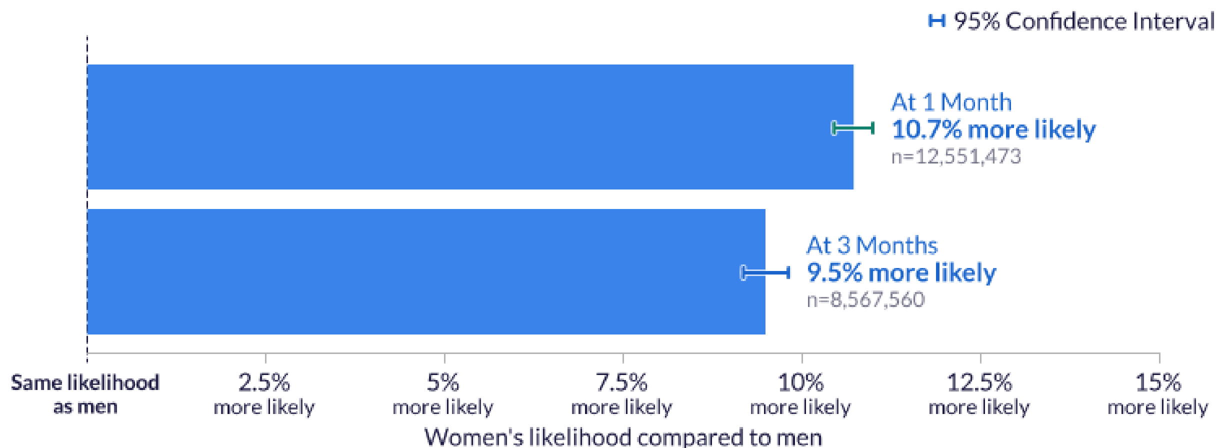

Figure 1. The likelihood of a patient reaching an SBP under 130 mmHg one and three months after starting treatment by sex.

Next, we evaluated long-term outcomes, including stroke and atherosclerotic cardiovascular disease (ASCVD) events. ASCVD events include myocardial infarction (MI), peripheral arterial disease, and acute coronary syndrome. We found that women were 4.3% less likely to have a stroke and 23.8% less likely to have an ASCVD event within three years of starting the treatment, as seen in Figure 2.

Women's Likelihood of Stroke or ASCVD Event Within Three Years Compared to Men

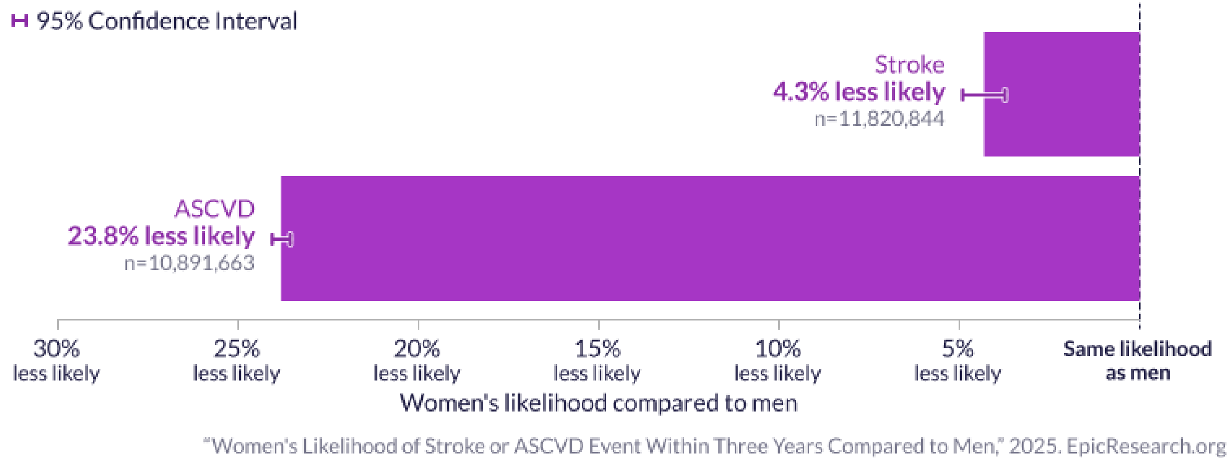

Figure 2. The likelihood of a patient having a stroke or ASCVD event within three years after starting treatment by sex.

Individual medication dosages and patient adherence to their prescribed medication were not studied as part of this analysis. Additionally, even though baseline SBP differs by sex, we found similar results after adjusting for baseline SBP.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 299 million patient records from 1,700 hospitals and more than 40,000 clinics from all 50 U.S. states, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Brian Olson.

References

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Data Definitions

Term	Definition
Study period	1/1/1998 to 3/1/2025
Study population	**Antihypertensive trials** started for adult patients with a baseline SBP greater than 130 mmHg where the patient was not pregnant during the treatment and the patient had a legal sex of "male" or "female." Each patient was represented by a single trial.
Exposures	Legal sex
Outcomes	• Reaching SBP under 130 mmHg at one and three months after trial start • **Stroke** within three years, excluded patients with prior stroke history • **ASCVD event** within three years, excluded patients with prior ASCVD event
Confounders	Age **Race and ethnicity** **RUCA** **Social Vulnerability Index** quintile Preceding trial medication classes Established **ASCVD** Established **CKD** Established **diabetes** Established **heart failure** History of smoking Baseline SBP • 130.00–139.99 • 140.00–149.99 • 150.00–159.99 • >= 160.00
Antihypertensive trials	Intervention trials are defined by outpatient medication orders for medications used to treat hypertension, which include ace inhibitors, alpha blockers, angiotensin II receptor blockers, beta blockers, calcium channel blockers, centrally-acting antihypertensives, renin inhibitors, vasodilators, thiazide diuretics, thiazide-like diuretics, loop diuretics, and potassium-sparing diuretics.
Race and ethnicity	Patients classified by self-reported ethnicity (Hispanic, non-Hispanic) and race (Asian, Black, White, or Other Race)
Model specifications	Logistic regression
ASCVD event	One of the following diagnoses • Acute coronary syndrome: ICD-10-CM code I24.9 • Myocardial infarction: ICD-10-CM code I21*, I22* • Angina pectoris: ICD-10-CM code I20.8, I20.9, I25.11, I25.118, I25.119, I20.0, or I25.110 • Stroke: ICD-10-CM code I63* • Peripheral arterial disease: ICD-10-CM code I70.2*-I70.9* • Arterial revascularization: ICD-10-CM code Z95.5, I25.7* (excluding I25.74* and I25.75*), I25.810, I25.812, T82.21*,

	T82.310*-T82.312*, T82.320*-T82.322*, T82.330*-T82.332*, or T82.391*-T82.392*
CKD	A diagnosis with N18*, I12*, or I13*
Diabetes	A diagnosis with E10*, E11*, or E13*
Heart failure	A diagnosis with I50*
Stroke	A diagnosis with I60*-I63*

Table 1: Women's Likelihood of Achieving Blood Pressure Control Compared to Men

	Odds Ratio	95% CI Low	95% CI High
At 1 Month	1.11	1.10	1.11
At 3 Months	1.09	1.09	1.10

Table 2: Women's Likelihood of Stroke or ASCVD Event Within Three Years Compared to Men

	Odds Ratio	95% CI Low	95% CI High
Stroke	0.96	0.95	0.96
ASCVD	0.76	0.76	0.76