

ONLINE SUPPLEMENT

Angiotensin converting enzyme inhibitor or angiotensin receptor blocker use among hypertensive US adults with albuminuria

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Table S1: Summary of US Hypertension Guideline Recommendations for Angiotensin Converting Enzyme Inhibitor or Angiotensin Receptor Blocker Use in Albuminuria

Guideline	Recommendation	Grade
2003 Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7)	Recommend ACEi or ARB therapy as initial hypertension treatment in the setting of CKD. CKD operationally defined as either (1) eGFR <60 ml/min/1.73m ² or (2) the presence of albuminuria (>300 mg/day or 200 mg/g)	Not graded
2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC8)	In the population aged 18 years or older with CKD and hypertension, initial (or add-on) antihypertensive treatment should include an ACEi or ARB to improve kidney outcomes. This applies to all CKD patients with hypertension regardless of race or diabetes status. CKD operationally defined as eGFR less than 60 mL/min/1.73m ² and in people of any age with albuminuria defined as UACR greater than 30 mg/g)	Grade B (moderate recommendation)
2017 ACC/AHA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines	In adults with hypertension and CKD (stage 3 or higher or stage 1 or 2 with albuminuria [≥ 300 mg/d, or ≥ 300 mg/g albumin-to-creatinine ratio or the equivalent in the first morning void]), treatment with an ACE inhibitor is reasonable to slow kidney disease progression. Treatment with an ARB may be reasonable if an ACE inhibitor is not tolerated.	Ila (moderate) for ACEi; IIb (weak) for ARB

Abbreviations: ACC = American College of Cardiology; ACEi = angiotensin converting enzyme inhibitor; AHA = American Heart Association; ARB = angiotensin receptor blocker; CKD = chronic kidney disease; eGFR = estimated glomerular filtration rate; JNC = Joint National Commission; UACR = urine albumin/creatinine ratio.

Table S2: Prevalence ratios and 95% confidence intervals for ACEi/ARB use among hypertensive US adults by albuminuria status, NHANES 2013-2018 (Sensitivity Analysis: using BP \geq 130/90 in definition of hypertension)

Urine albumin/creatinine ratio	Model 1 ^a PR (95% CI)	Model 2 ^b PR (95% CI)	Model 3 ^c PR (95% CI)
Overall			
<30 mg/g	1.00 (reference)	1.00 (reference)	1.00 (reference)
30-299 mg/g	1.35 (1.25-1.46)	1.17 (1.08-1.27)	1.13 (1.04-1.22)
\geq 300 mg/g	1.25 (1.09-1.43)	1.09 (0.93-1.28)	0.95 (0.81-1.12)
No Diabetes			
<30 mg/g	1.00 (reference)	1.00 (reference)	1.00 (reference)
30-299 mg/g	1.30 (1.16-1.47)	1.12 (0.99-1.27)	1.20 (1.06-1.37)
\geq 300 mg/g	1.06 (0.75-1.49)	0.93 (0.62-1.40)	0.86 (0.60-1.24)
Diabetes			
<30 mg/g	1.00 (reference)	1.00 (reference)	1.00 (reference)
30-299 mg/g	1.00 (0.90-1.12)	0.98 (0.88-1.09)	1.04 (0.94-1.16)
\geq 300 mg/g	0.83 (0.72-0.95)	0.81 (0.70-0.94)	0.94 (0.78-1.13)

^a Model 1 is unadjusted.

^b Model 2 is adjusted for age, sex, and race/ethnicity.

^c Model 3 is adjusted for Model 2 covariates plus systolic blood pressure (continuous), estimated glomerular filtration rate (continuous), and diabetes (overall model only).

Results shown for sensitivity analysis using systolic blood pressure \geq 130 mmHg as the cutoff to define hypertension.

Abbreviations: CI = confidence interval; NHANES = National Health and Nutrition Examination Survey; PR = prevalence ratio.

Table S3: Prevalence ratios and 95% confidence intervals for ACEi/ARB use among hypertensive US adults by albuminuria status, NHANES 2013-2018 (Sensitivity Analysis: hypertension defined by BP and medication use)

Urine albumin/creatinine ratio	Model 1 ^a PR (95% CI)	Model 2 ^b PR (95% CI)	Model 3 ^c PR (95% CI)
Overall			
<30 mg/g	1.00 (reference)	1.00 (reference)	1.00 (reference)
30-299 mg/g	1.13 (1.05-1.21)	1.08 (1.01-1.16)	1.09 (1.02-1.17)
≥300 mg/g	1.01 (0.88 -1.16)	0.98 (0.84-1.13)	0.96 (0.82-1.12)
No Diabetes			
<30 mg/g	1.00 (reference)	1.00 (reference)	1.00 (reference)
30-299 mg/g	1.09 (0.98-1.21)	1.04 (0.93-1.17)	1.16 (1.05-1.28)
≥300 mg/g	0.88 (0.63-1.22)	0.86 (0.60-1.25)	0.89 (0.63-1.26)
Diabetes			
<30 mg/g	1.00 (reference)	1.00 (reference)	1.00 (reference)
30-299 mg/g	0.95 (0.86-1.06)	0.95 (0.85-1.05)	1.01 (0.91-1.12)
≥300 mg/g	0.78 (0.68-0.89)	0.77 (0.68-0.89)	0.91 (0.77-1.08)

^a Model 1 is unadjusted.

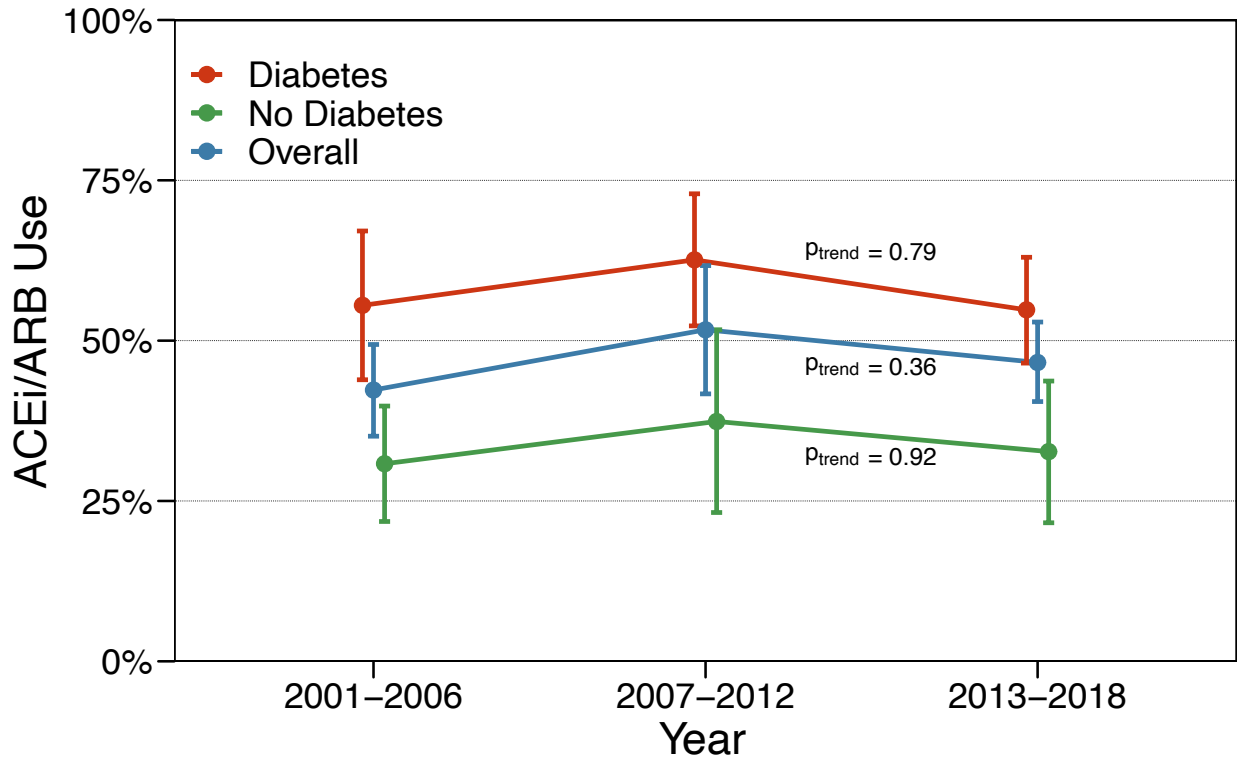
^b Model 2 is adjusted for age, sex, and race/ethnicity.

^c Model 3 is adjusted for Model 2 covariates plus systolic blood pressure (continuous), estimated glomerular filtration rate (continuous), and diabetes (overall model only).

Results shown for sensitivity analysis using only measured blood pressure and antihypertensive medication use to define hypertension (ignoring self-reported diagnosis).

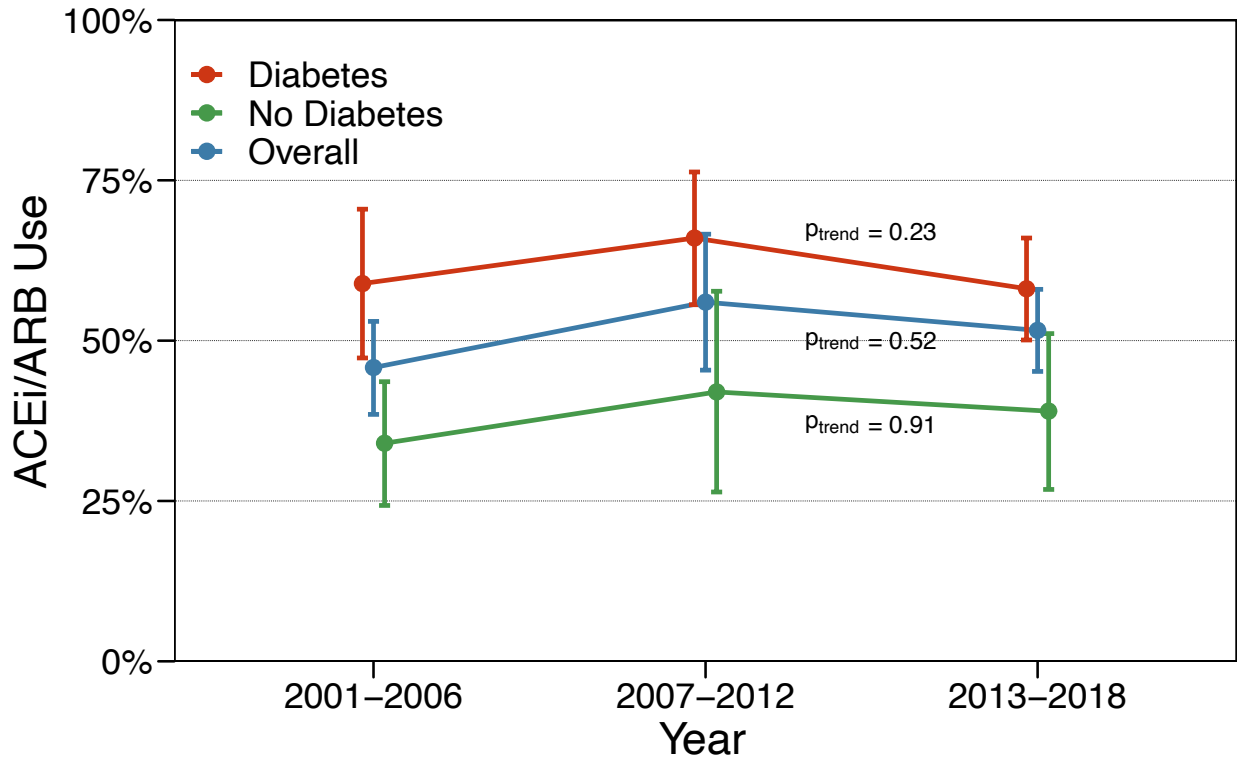
Abbreviations: BP = blood pressure; CI = confidence interval; NHANES = National Health and Nutrition Examination Survey; PR = prevalence ratio.

Figure S1: Age-adjusted ACEi/ARB usage among hypertensive US adults with UACR ≥ 300 mg/g, overall and by diabetes status, NHANES 2001-2018, n = 871 (Sensitivity Analysis: using BP $\geq 130/90$ in definition of hypertension)



Results shown for sensitivity analysis using systolic blood pressure ≥ 130 mmHg as the cutoff to define hypertension. Abbreviations: ACEi = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker; NHANES = National Health and Nutrition Examination Survey; UACR = urine albumin/creatinine ratio.

Figure S2: Age-adjusted ACEi/ARB usage among hypertensive US adults with UACR ≥ 300 mg/g, overall and by diabetes status, NHANES 2001-2018, n = 803 (Sensitivity Analysis: hypertension defined by BP and medication use)



Results shown for sensitivity analysis using only measured blood pressure and antihypertensive medication use to define hypertension (ignoring self-reported diagnosis).

Abbreviations: ACEi = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker; NHANES = National Health and Nutrition Examination Survey; UACR = urine albumin/creatinine ratio.