# Medicine by the Numbers

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# Beta Blockers Compared with Other Drug Options for the Treatment of Hypertension

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## Details for This Review

**Study Population:** Nonpregnant adults with hypertension who have been treated for at least one year with a beta blocker

**Efficacy End Points:** Reduction in incidence of mortality, stroke, coronary heart disease, or total cardiovascular disease

**Harm End Points:** Mortality, stroke, coronary heart disease, cardiovascular events, or nonadherence due to adverse effects

**Narrative:** Hypertension is one of the leading causes of disability and contributors to early death worldwide.[1] Beta blockers have been shown to have a mortality benefit in persons with heart failure or acute myocardial infarction.[2-5] However, their benefit as a first-line treatment for hypertension is controversial.[6-8] In this 2017 Cochrane review of 13 randomized controlled trials with 91,561 participants, the effectiveness of beta blockers was compared with placebo, diuretics, renin-angiotensin system (RAS) inhibitors, and calcium channel blockers.[9] Beta blockers had no significant effect on mortality when compared with placebo (four studies, N = 23,613; relative risk [RR] = 0.99; 95% confidence interval [CI], 0.88 to 1.11; moderate certainty evidence), diuretics (five studies, N = 18,241; RR = 1.04; 95% CI, 0.91 to 1.19; moderate certainty evidence), or RAS inhibitors (three studies, N = 10,828; RR = 1.10; 95% CI, 0.98 to 1.24; moderate certainty evidence). Beta blockers were possibly inferior to calcium channel blockers for mortality (RR = 1.077; 95% CI, 1.00 to 1.14; moderate certainty evidence). Beta blockers showed a lower risk of stroke when compared with placebo (four studies, N = 23,613; RR = 0.80; 95% CI, 0.66 to 0.96; low certainty evidence; number needed to treat [NNT] = 200). However, beta blockers were found to be inferior for stroke reduction when compared with calcium channel blockers (three studies, N = 44,167; RR = 1.24; 95% CI, 1.11 to 1.40; moderate certainty evidence; number needed to harm [NNH] = 180) and RAS inhibitors (two studies, N = 9,951; RR = 1.30; 95% CI, 1.11 to 1.53; moderate certainty evidence; NNH = 65) for stroke. Beta blockers showed a reduction in total cardiovascular events compared with placebo (four studies, N = 23,613; RR = 0.88; 95% CI, 0.79 to 0.97; low certainty evidence; NNT = 140); however, the effect was driven by the above-mentioned stroke reduction because there was no significant difference in the outcome for coronary heart disease (four studies, N = 23,613; RR = 0.93; 95% CI, 0.81 to 1.07; moderate certainty evidence).In individuals older than 65 years, one randomized controlled trial (4,396 patients) found atenolol to be inferior to diuretics in reducing coronary heart disease (RR = 1.63;

### BETA BLOCKERS COMPARED WITH OTHER DRUG OPTIONS FOR THE TREATMENT OF HYPERTENSION

Compared with placebo:

- 1 in 200 had a stroke prevented over five years
- 1 in 140 had a cardiovascular event prevented over five years
- No deaths were prevented

Compared with diuretics:

- No strokes, coronary heart disease, cardiovascular events, or overall deaths were prevented
- No reported nonadherence due to adverse effects

Compared with renin-angiotensin system inhibitors:

- 1 in 65 had a stroke
- 1 in 18 had an adverse effect causing nonadherence
- No coronary heart disease, cardiovascular events, or overall deaths were prevented

Compared with calcium channel blockers:

- 1 in 180 had a stroke
- 1 in 80 had a cardiovascular event
- 1 in 200 died
- No coronary heart disease was prevented
- No reported nonadherence due to adverse effects

### The NNT Group Rating System

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|---|---|
| Green | Benefits greater than harms |
| Yellow | Unclear benefits |
| Red | No benefits |
| Black | Harms greater than benefits |

95% CI, 1.15 to 2.32; NNH = 196]; however, the study is at risk of bias because of a high attrition rate of 25%.[10]

Beta blockers also had a higher rate of withdrawal from studies because of adverse effects such as fatigue and sexual dysfunction when compared with RAS inhibitors [two studies, N = 9,951; RR = 1.41; 95% CI, 1.29 to 1.54; moderate certainty evidence; NNH = 18]. There was no significant difference in the rates of nonadherence caused by adverse effects compared with other antihypertensives or with placebo.

**Caveats:** Although beta blockers seem to have a positive impact on patient-oriented evidence that matters, they appear to be inferior when compared with other medications. Additionally, beta blockers are likely to have a higher rate of adverse effects leading to patient nonadherence. Most studies were judged to have a high risk of bias because of a variety of issues, including inadequate blinding, incomplete data caused by high attrition rates, and heterogeneity in the subsequent antihypertensive medications added to treatment regimens after the beta blocker. Most studies were conducted in Western Europe and North America. None of the studies involved the newer vasodilatory beta blocker nebivolol (Bystolic); atenolol was the beta blocker most commonly used. The review was not able to differentiate between subtypes of beta blockers, which are a class of medication with unique properties. The difference of impact on younger vs. older patients shows that age can affect the effictiveness of the medication, although the study incorporated a high attrition bias. Studies reviewed included those published through June 2016.



**This series** is coordinated by Dean A. Seehusen, MD, MPH, *AFP* Contributing Editor, and Daniel Runde, MD, from the NNT Group.

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