Blood Pressure Lowering Medication and Cardiovascular Disease

Note: *Risk stratifications were based on their own risk models of the data (Weibull models with shared frailty) at hand so it is difficult to be certain how well they match to the Framingham risk scores based on the information provided. A crude comparison of the Australian guidelines to the risk stratifications used in this paper can be found below:*

	Australian Guidelines	*Trialist Collaboration*
Low	*<10%*	*<11%*
Medium/Moderate	*10–15%*	*11–15%*
High	*>15%*	*15–21%*
Very High	*–*	*>21%*

Population: Adults (mean age: 59.4 years) with **Low CVD Risk Group** (<11%)
Intervention: Blood pressure lowering medication (ACE Inhibitor, Calcium Channel Blocker, Diuretic) or More intensive blood pressure-lowering regimen
Comparator: Placebo or less intensive blood pressure-lowering regimen

Benefits: On placebo the rate for a major CVD event is approximately 42 per 1000 after 5 years for those with a low risk 5-year risk of CVD. On blood pressure medication there will be 8 fewer major CVD events out of 1000 individuals after 5 years for those with a low risk 5-year risk of CVD.

Outcome 5 years	**Study results and measurements**	**Certainty in effect estimates** (Quality of evidence)	**Absolute effect estimates** Placebo / Less Intensive	BP Meds / More Intensive	**Summary**
Major CVD Event	Relative risk: 0.82 (CI 95% 0.73 - 0.93) Based on data from 14836 patients in 11 studies	Low risk of bias	**42 per 1000**	**34 per 1000** **Difference: 8 fewer per 1000** (CI 95% 11 fewer - 3 fewer)	BP lowering medication decreases the 5-year risk for a major CVD Event in those with a Low 5-year CVD Risk

Population: Adults (means age: 67.8 years) with **Medium CVD Risk Group** (11-15%)
Intervention: Blood pressure lowering medication (ACE Inhibitor, Calcium Channel Blocker, Diuretic) or More intensive blood pressure-lowering regimen
Comparator: Placebo or less intensive blood pressure-lowering regimen

Benefits: On placebo the rate for a major CVD event is approximately 47 per 1000 after 5 years for those with a medium risk 5-year risk of CVD. On blood pressure medication there will be 7 fewer major CVD events out of 1000 individuals after 5 years for those with a medium risk 5-year risk of CVD.

Outcome 5 years	**Study results and measurements**	**Certainty in effect estimates** (Quality of evidence)	**Absolute effect estimates**		**Summary**
			Placebo / Less Intensive	BP Meds / More Intensive	
Major CVD Event	Relative risk: 0.85 (CI 95% 0.75 - 0.96) Based on data from 12544 patients in 11 studies	Low risk of bias	**47 per 1000**	**40 per 1000** **Difference: 7 fewer per 1000** (CI 95% 12 fewer - 2 fewer)	BP lowering medication decreases the 5-year risk for a major CVD Event in those with a Medium 5-year CVD Risk

Population: Adults (means age: 72.0 years) **High CVD Risk Group** (15-21%)
Intervention: Blood pressure lowering medication (ACE Inhibitor, Calcium Channel Blocker, Diuretic) or More intensive blood pressure-lowering regimen
Comparator: Placebo or less intensive blood pressure-lowering regimen

Benefits: On placebo the rate for a major CVD event is approximately 132 per 1000 after 5 years for those with a high risk 5-year risk of CVD. On blood pressure medication there will be 17 fewer major CVD events out of 1000 individuals after 5 years for those with a high risk 5-year risk of CVD.

Outcome 5 years	**Study results and measurements**	**Certainty in effect estimates** (Quality of evidence)	**Absolute effect estimates**		**Summary**
			Placebo / Less Intensive	BP Meds / More Intensive	
Major CVD Event	Relative risk: 0.87 (CI 95% 0.78 - 0.98) Based on data from 8287 patients in 11 studies	Low risk of bias	**132 per 1000**	**115 per 1000** **Difference: 17 fewer per 1000** (CI 95% 29 fewer - 3 fewer)	BP lowering medication decreases the 5-year risk for a major CVD Event in those with a High 5-year CVD Risk

Population: Adults (mean age: 75.1 years) **Very High CVD Risk Group** (>21%)
Intervention: Blood pressure lowering medication (ACE Inhibitor, Calcium Channel Blocker, Diuretic) or More intensive blood pressure-lowering regimen
Comparator: Placebo or less intensive blood pressure-lowering regimen

Benefits: On placebo the rate for a major CVD event is approximately 200 per 1000 after 5 years for those with a very high risk 5-year risk of CVD. On blood pressure medication there will be 30 fewer major CVD events out of 1000 individuals after 5 years for those with a very high risk 5-year risk of CVD.

Outcome 5 years	**Study results and measurements**	**Certainty in effect estimates** (Quality of evidence)	**Absolute effect estimates**		**Summary**
			Placebo / Less Intensive	BP Meds / More Intensive	
Major CVD Event	Relative risk: 0.85 (CI 95% 0.76 - 0.95) Based on data from 5606 patients in 11 studies	Low risk of bias	**200 per 1000**	**170 per 1000**	BP lowering medication decreases the 5-year risk for a major CVD Event in those with a Very High 5-year CVD Risk
			Difference: 30 fewer per 1000 (CI 95% 48 fewer - 10 fewer)		

Population: Adults (mean age: 65.1 years)
Intervention: Blood pressure lowering medication (ACE Inhibitor, Calcium Channel Blocker, Diuretic) or More intensive blood pressure-lowering regimen
Comparator: Placebo or less intensive blood pressure-lowering regimen

Benefits: On placebo the rate for a major CVD event is approximately 200 per 1000 after 5 years for those with a very high risk 5-year risk of CVD. On blood pressure medication there will be 30 fewer major CVD events out of 1000 individuals after 5 years for those with a very high risk 5-year risk of CVD.

Outcome 5 years	**Study results and measurements**	**Certainty in effect estimates** (Quality of evidence)	**Absolute effect estimates**		**Summary**
			Placebo / Less Intensive	BP Meds / More Intensive	
Major CVD Event	Relative risk: 0.96 (CI 95% 0.90 – 1.02) Based on data from 51917 patients in 11 studies	Moderate risk of bias*	**79* per 1000**	**82* per 1000**	BP lowering medication has little to no difference on the 5-year risk for a major CVD Event
			Difference: 3* fewer per 1000 (CI 95% 8* fewer – 1* more)		

*These numbers were generated from the Crude Numbers provided in the tables; without the raw data is it not possible to create a pooled estimate of the overall effect of blood pressure lowering medication on future CVD risk that accounts for variation across studies; which is lacking in the Trialists Collaboration paper

References

Blood Pressure Lowering Treatment Trialists' Collaboration. Blood pressure-lowering treatment based on cardiovascular risk: a meta-analysis of individual patient data. The Lancet. 2014 Aug 22;384(9943):591-8.

Practical Issues

Medical routine

How often do I need to take the medication

Most BP Lowering Medication requires that they be taken daily. The amount of tablets/capsule per day may vary with each class of medication, which would be explained by your doctor.

Adverse effects, interactions and antidote

Are there any side effects from taking blood pressure lowering medications?

Some side effects include:

- Hypotension (low blood pressure) – 14 in 1000 aiming for <140 mm Hg may present with hypotension compared to 23 in 1000 aiming for <120 mm Hg.
- Syncope (Fainting) – 17 in 1000 aiming for <140 mm Hg may present with hypotension compared to 23 in 1000 aiming for <120 mm Hg.
- Acute kidney injury/renal failure: 25 in 1000 aiming for <140 mm Hg may present with hypotension compared to 41 in 1000 aiming for <120 mm Hg

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Cost and access

How much will the blood pressure lowering medication cost?

Prices depend on the specific blood pressure lowering medication. In Australia:

- Atenolol (Beta-Blocker) 30 × 50 mg tablets = $12.23
- Amlodipine (Calcium Channel Blocker) 30 × 20 mg tablets = $12.67
- Perindopril (ACE Inhibitor) 30 × 2 mg tablets = $12.92
- Frusemide (Diuretic) 5 × 2 mL ampoules = $ 13.24
