Cost-effectiveness of antihypertensive deprescribing in primary care: a Markov modelling study using data from the OPTiMISE trial

Supplementary appendix

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Table S1. Model costs

Costs		
Care/clinical event	**Cost per patient**	
Usual Care (3 months)	£50.43	0.8 GP consultations and average medication from OPTiMISE (£18.03)
Medication reduction (first 3 months)	£54.97	1 GP consultation and average medication from OPTiMISE (£14.47)
Medication reduction (subsequent 3 months)	£46.87	0.8 GP consultations and average medication from OPTiMISE (£14.47)
GP consultation (10 minutes)	£40.50	Curtis *et al.*, 2018[1]
Nurse consultation (10 minutes)	£7.00	as above
Acute stroke	£8,767	Luengo-Fernandez *et al.*, 2012[2]
Post-stroke (3 months)	£351	as above
Acute TIA	£1,166	Ward *et al.*, 2007;[3] NICE guidance, BNF, 2018[4]
Post-TIA (3 months)	£19	NICE guidance, BNF, 2018[4]
Acute MI	£5,415	Palmer *et al.*, 2002[5]
Post-MI (3 months)	£240	Taylor *et al.*, 2009[6]
ACS	£3,249	Assumed to be 60% of initial costs of myocardial infarction
Ongoing ACS (3 months)	£144	Assumed to be 60% of costs after myocardial infarction
Acute stable angina	£409	An outpatient cardiology assessment plus non-invasive imaging SPECT-CT scan (NHS Reference costs, 2018)[7]
Ongoing stable angina (3 months)	£6.19	NICE, 2011,[8] BNF, 2018[4]
Acute HF (diagnosis)	£3,057	Griffiths *et al.*, 2014[9]
Ongoing HF	£88	as above
Acute serious fall (hip fracture)	£10,684	NICE, 2017[10]
Rehab/physical therapy post fall (3 months)	£147	Polinder *et al.*, 2016[11]
AKI	£6,313	NHS Reference costs, 2018[7]
Post AKI (3 months)	£1,619	Hall *et al.*, 2018[12]
Hypotension	£81.00	2 GP visits (assumption)
Syncope	£101.25	2.5 GP visits (assumption)
Bradycardia	£121.50	3 GP visits (assumption)
Electrolyte abnormalities	£111.75	2.5 GP visits and 1.5 nurse visits (assumption)

Non-serious fall	£40.50	1 GP visit (assumption)

GP=General Practitioner; NICE=National Institute of Health and Care Excellence; MI=Myocardial infarction; TIA=Transient Ischaemic Attack; ACS=Acute Coronary Syndrome; HF=Heart failure; AKI=Acute kidney injury

Table S2. Key model assumptions

Assumption	**Justification**
The difference in blood pressure at 12-weeks was assumed to be sustained over patient lifetime.	The was justified in the absence of long-term follow-up data from the trial and tested in sensitivity analyses
Treatment safety and efficacy estimates of *deprescribing* were estimated from a meta-analysis of treatment *intensification* trials	There are very few safety and efficacy data from deprescribing studies (very few have been undertaken and have short follow-up).
Only one clinical event could occur in a 3-month time cycle.	To limit the complexity of the model and ensure the analysis was feasible.
Patient moved to a post-event health state after cardiovascular events and serious adverse events and recurrent events were not modelled.	To limit the complexity of the model and ensure the analysis was feasible.
10-year cardiovascular risk was calculated using the QRisk2 algorithm.	This is used in routine clinical practice in the UK to estimate CVD risk. There are no validated risk scores for patients aged 85 years and over.
A multiplier of 1.5 was applied to 10-year cardiovascular risk for patients with existing CVD conditions.	Expert opinion in the absence of any data in this population.
Utility values for long-term events and serious adverse effects of treatment were applied multiplicatively to baseline utility scores.	Considered best practice and routinely undertaken in NICE health economic assessments.
Disutilities for TIA and minor side effects were assumed to last for one month and were subtracted from utility scores for one 3-month cycle, and disutility for acute kidney disease was applied every cycle over patient lifetime.	Expert opinion in the absence of any data in this population.

Table S3. Sensitivity analysis showing effect varying the relative risk associated with outcome events on the estimated incremental cost effectiveness ratio (ICER)

Condition	ICER (£ per QALY gained)*		
	Relative risk=1 (no increase risk)	**Relative risk =lower CI**	**Relative risk =upper CI**
Cerebrovascular disease (Stroke/TIA)	£5,753	£4,216	£2,846
CHD	£3,010	£3,657	£2,580
Heart failure	£9,374	£4,702	£2,100
CHD, heart failure, cerebrovascular disease	£178,631	£17,071	£1,478
CHD, cerebrovascular disease	£5,882	£5,956	£1,822
Serious adverse events	-£784 (usual care dominates)	£7,704	-£4,656 (usual care dominates)
Non-serious adverse events	£2,907	£3,318	£2,736
Adverse events and serious adverse events	-£755 (usual care dominates)	£7,971	-£4,636 (usual care dominates)

*All ICERs for usual care unless otherwise stated

TIA= transient ischemic attack; CHD=coronary heart disease; QALY=quality adjusted life years; ICER=incremental cost effectiveness ratio

Table S4. Sensitivity analyses showing the effect of assuming different effects of blood pressure and absolute cardiovascular risk on the estimated incremental cost effectiveness ratio (ICER)

Strategy	**ICER (£/QALY)***
Lower 95% CI of BP increase (1mmHg) (Cardiovascular RRs only)	£13,834
Lower 95% CI of BP increase (1mmHg) (All RRs)	£3,189
Absolute risks halved for all cardiovascular events	£4,526
5-year time horizon	£2,549
Length of time BP difference is sustained	
10 years	£3,026
5 years	£3,087
4 years	£3,207
3 years	£3,537
2 years	£3,588
1 years	£4,159

*ICER favours usual care

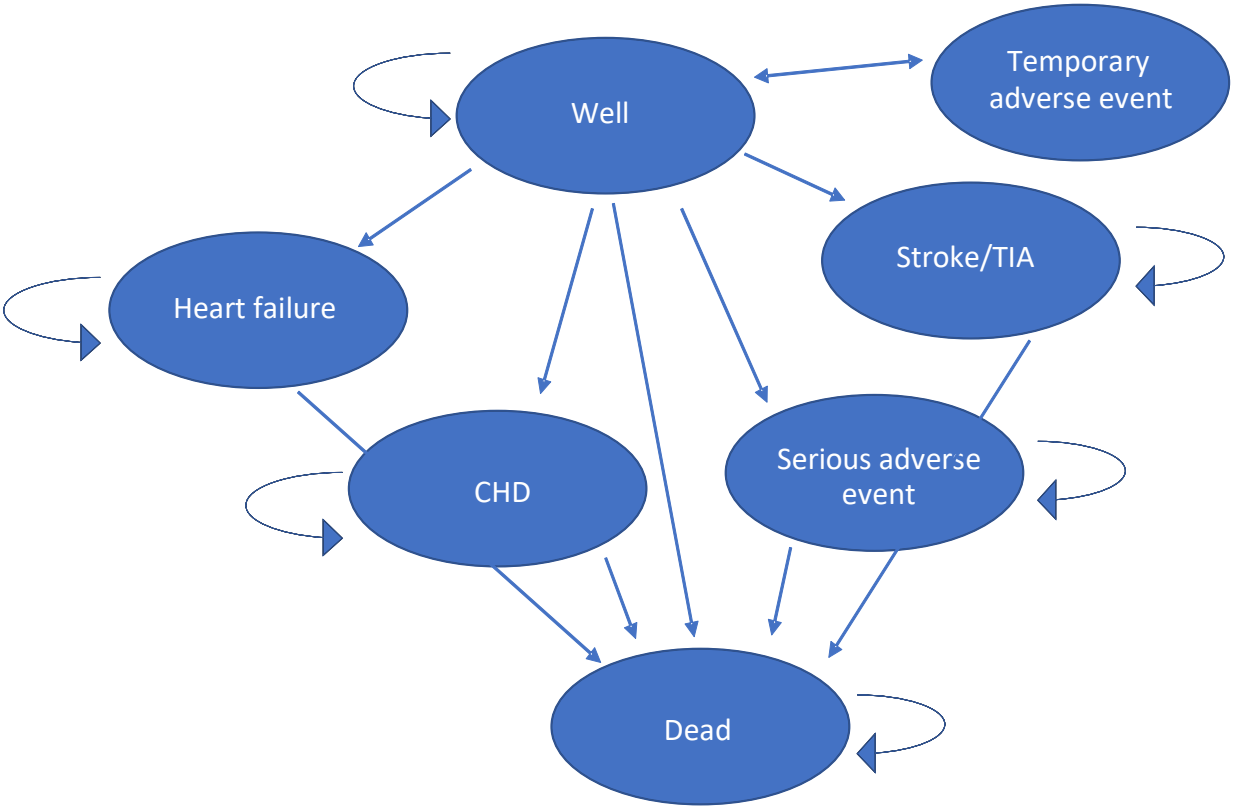
BP=systolic blood pressure; RR=relative risks;

Table S5. Sub-group analyses showing the incremental cost effectiveness ratio (ICER) by baseline frailty and cardiovascular co-morbidities.

Strategy	**ICER (£/QALY)***
Frailty subgroup	
Fit	£3,397
Frail	£2,815
Previous history of cardiovascular disease	
None	£4,737
One condition	£2,939
Two or more conditions	£1,801

*ICER favours usual care

Figure S1. Markov model structure



Straight-line arrows denote movement from one health state to another

Curved-line arrows denote remaining in a health state