

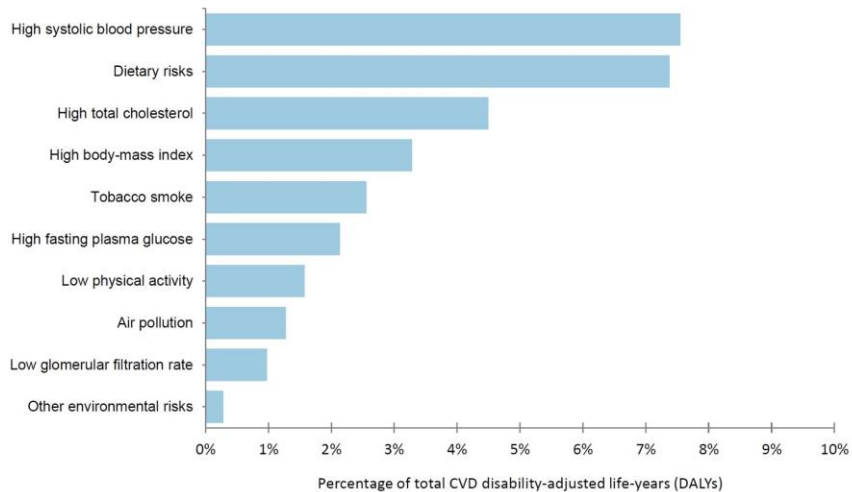
Hypertension: The Silent Killer

Making a difference in Primary Care



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Global Burden of Disease Study 2015 Risk Factors for premature death and disability caused by CVD in England, as a percentage of total disability-adjusted life-years



National Cardiovascular Intelligence Pack

10 year cardiovascular disease ambitions for England

Atrial fibrillation (AF)



85%

of the expected number of people with AF are detected by 2029

90%

of patients with AF who are already known to be at high risk of a stroke to be adequately anticoagulated by 2029

High blood pressure



80%

of the expected number of people with high blood pressure are diagnosed by 2029

80%

of the total number of people already diagnosed with high blood pressure are treated to target as per NICE guidelines by 2029

High cholesterol



75%

of people aged 40 to 74 have received a formal validated CVD risk assessment and cholesterol reading recorded on a primary care data system in the last five years by 2029

45%

of people aged 40 to 74 identified as having a 20% or greater 10-year risk of developing CVD in primary care are treated with statins by 2029

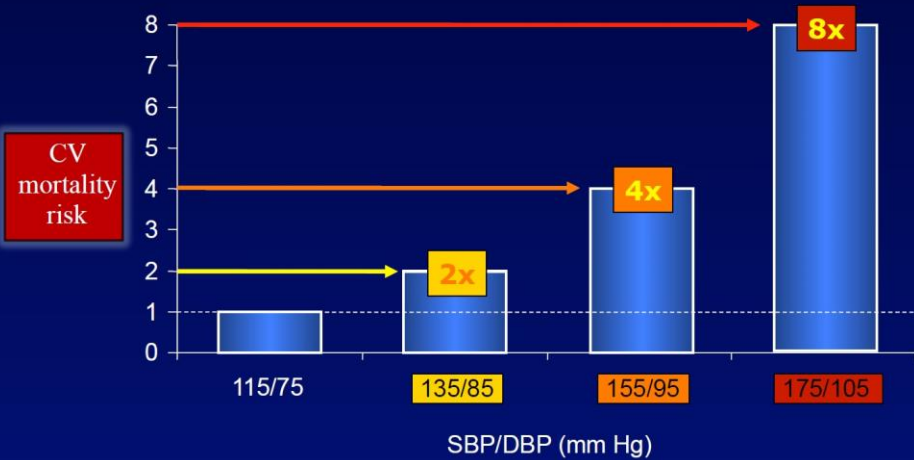
25%

of people with Familial Hypercholesterolaemia (FH) are diagnosed and treated optimally according to the NICE FH Guideline by 2024

The ambitions are underpinned by the need to do more to reduce health inequalities

Reduce the gap significantly in amenable CVD deaths between the most and least deprived areas by 2029

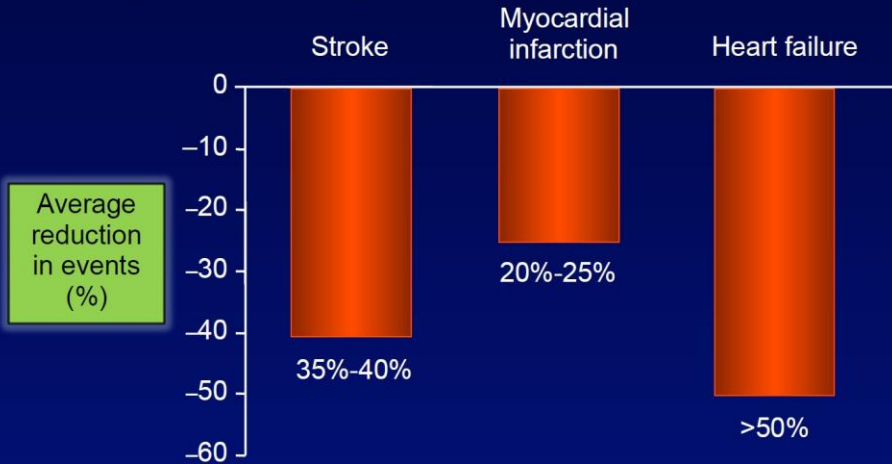
CV Mortality Risk Doubles with Each 20/10 mm Hg BP Increment*



*Individuals aged 40-70 years, starting at BP 115/75 mm Hg. CV, cardiovascular; SBP, systolic blood pressure; DBP, diastolic blood pressure

Lewington S, et al. *Lancet*. 2002; 60:1903-1913. JNC 7. *JAMA*. 2003;289:2560-2572.

Long-Term Antihypertensive Therapy Significantly Reduces CV Events

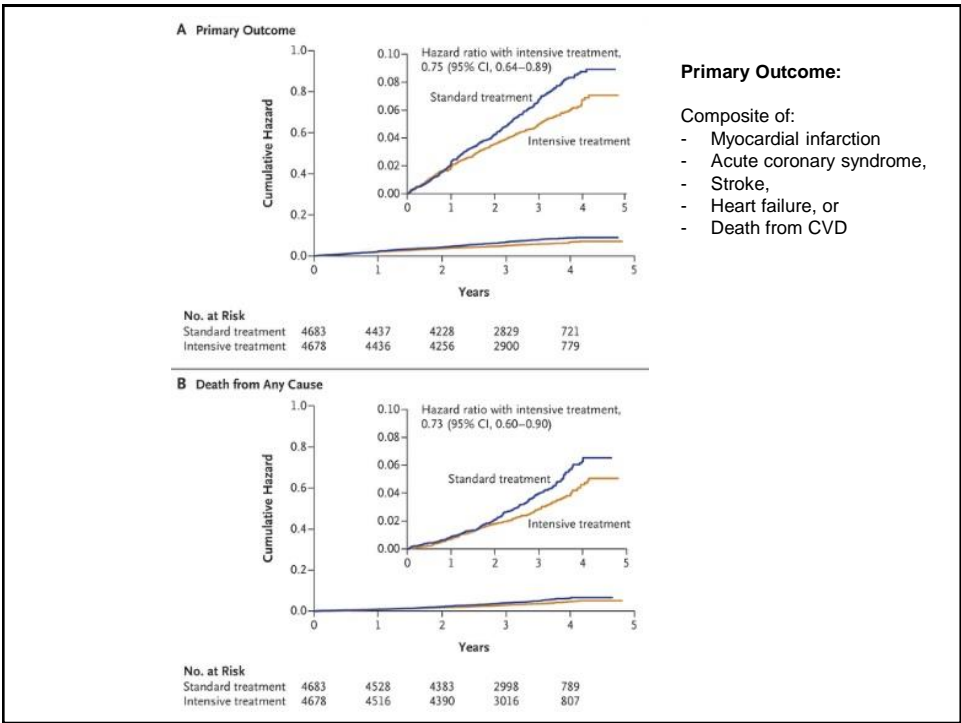
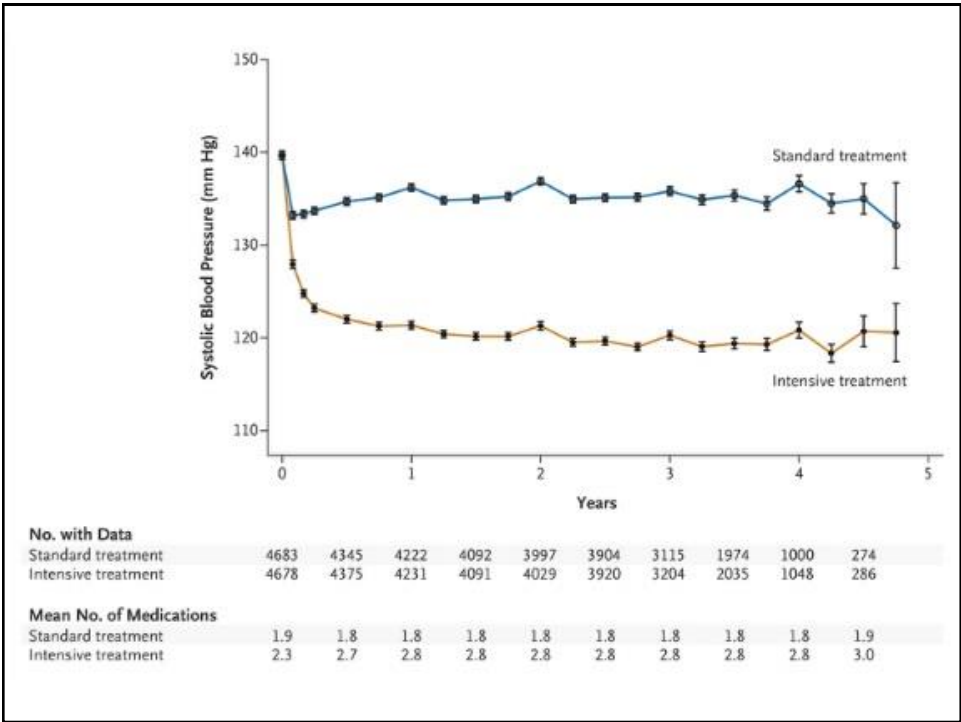


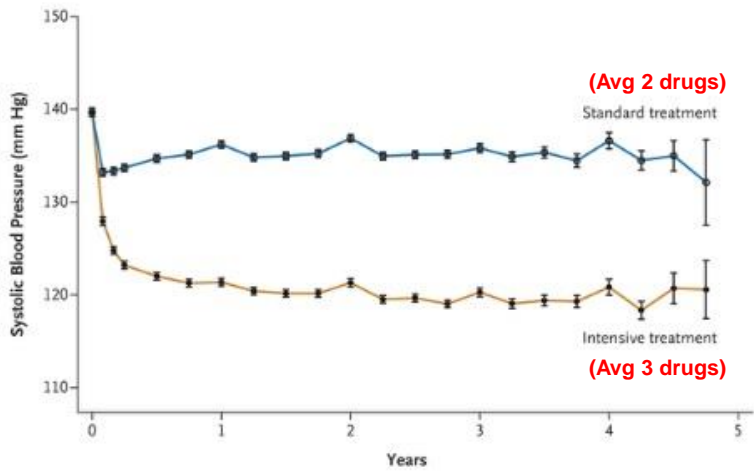
Blood Pressure Lowering Treatment Trialists' Collaboration. *Lancet*. 2000;355:1955-1964.

SPRINT TRIAL

Systolic Blood Pressure Interventional Trial

- Intensive (< 120mmHg) vs Standard (<140mmHg) BP Control
- Multicentre Study in USA
- 9361 patients:
 - > 50 yrs
 - SBP 130-180mmHg
 - ↑CV risk:
 - CKD (eGFR 20-60ml/min)
 - 10 yr Framingham risk > 15%
 - > 75 yrs
- Diabetics and prior stroke patients **excluded**





No. with Data	4683	4345	4222	4092	3997	3904	3115	1974	1000	274
Standard treatment	4683	4345	4222	4092	3997	3904	3115	1974	1000	274
Intensive treatment	4678	4375	4231	4091	4029	3920	3204	2035	1048	286

Mean No. of Medications	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
Standard treatment	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
Intensive treatment	2.3	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	3.0

Serious Adverse Events

Variable	Intensive Treatment (N=4678)	Standard Treatment (N=4683)	Hazard Ratio	P Value
Serious adverse event*	1793 (38.3)	1736 (37.1)	1.04	0.25
Conditions of interest				
Serious adverse event only				
Hypotension	110 (2.4)	66 (1.4)	1.67	0.001
Syncope	107 (2.3)	80 (1.7)	1.33	0.05
Bradycardia	87 (1.9)	73 (1.6)	1.19	0.28
Electrolyte abnormality	144 (3.1)	107 (2.3)	1.35	0.02
Injurious fall†	105 (2.2)	110 (2.3)	0.95	0.71
Acute kidney injury or acute renal failure‡	193 (4.1)	117 (2.5)	1.66	<0.001
Emergency department visit or serious adverse event				
Hypotension	158 (3.4)	93 (2.0)	1.70	<0.001
Syncope	163 (3.5)	113 (2.4)	1.44	0.003
Bradycardia	104 (2.2)	83 (1.8)	1.25	0.13
Electrolyte abnormality	177 (3.8)	129 (2.8)	1.38	0.006
Injurious fall†	334 (7.1)	332 (7.1)	1.00	0.97
Acute kidney injury or acute renal failure‡	204 (4.4)	120 (2.6)	1.71	<0.001
Monitored clinical events				
Adverse laboratory measures¶				
Serum sodium <130 mmol/liter	180 (3.8)	100 (2.1)	1.76	<0.001
Serum sodium >150 mmol/liter	6 (0.1)	0		0.02
Serum potassium <3.0 mmol/liter	114 (2.4)	74 (1.6)	1.50	0.006
Serum potassium >5.5 mmol/liter	176 (3.8)	171 (3.7)	1.00	0.97
Orthostatic hypotension¶¶				
Alone	777 (16.6)	857 (18.3)	0.88	0.01
With dizziness	62 (1.3)	71 (1.5)	0.85	0.35

NICE Guidance

Hypertension in adults: diagnosis and management

Draft for consultation, March 2019

NICE Highlights: Establishing a Diagnosis

- ABPM and HBPM are superior to clinic BPs in predicting CV outcomes
 - **Clinic BPs alone should not be used to diagnose hypertension**
- ABPM correlates well with invasive BP measurement and based on evidence remains the gold standard for the accurate measurement of BP in primary care
 - **ABPM remains the preferred method for the diagnosis of hypertension**
- Validated HBPM is an accurate method of diagnosing hypertension in sinus rhythm
 - **HBPM is a suitable alternative when ABPM is unsuitable or not tolerated**

NICE Highlights: Establishing a Diagnosis

- If clinic BP > 140/90 & < 180/110 offer ABPM to confirm diagnosis
- **ABPM:** 2 readings/hour and at least 14 daytime readings (or usual waking hours)
- **HBPM:** 2 readings taken \geq 1min apart per recording, twice daily and ideally for 7 days
- **Stage 1 HTN:** ABPM daytime average or HBPM average \geq 135/85 mmHg

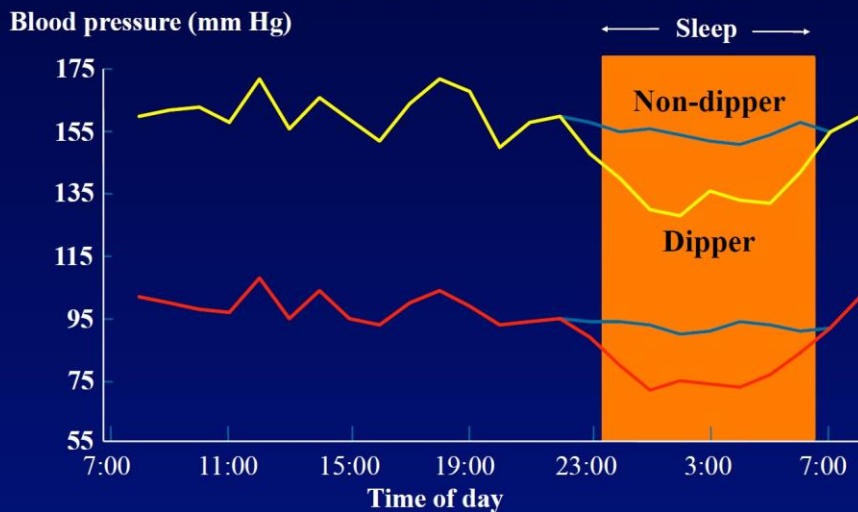
Costs and savings for total population of England

Costs and savings of using ABPM to confirm diagnosis of hypertension

Year	Change in diagnosis cost (£m)	Change in treatment cost (£m)	Net resource impact (£m)
Year 1	£5.1	- £2.5	£2.6
Year 2	£5.1	- £5.8	- £0.7
Year 3	£5.1	- £9.1	- £4.0
Year 4	£5.1	-£12.4	- £7.3
Year 5	£5.1	-£15.7	-£10.5



24-Hour Blood Pressure (ABPM)

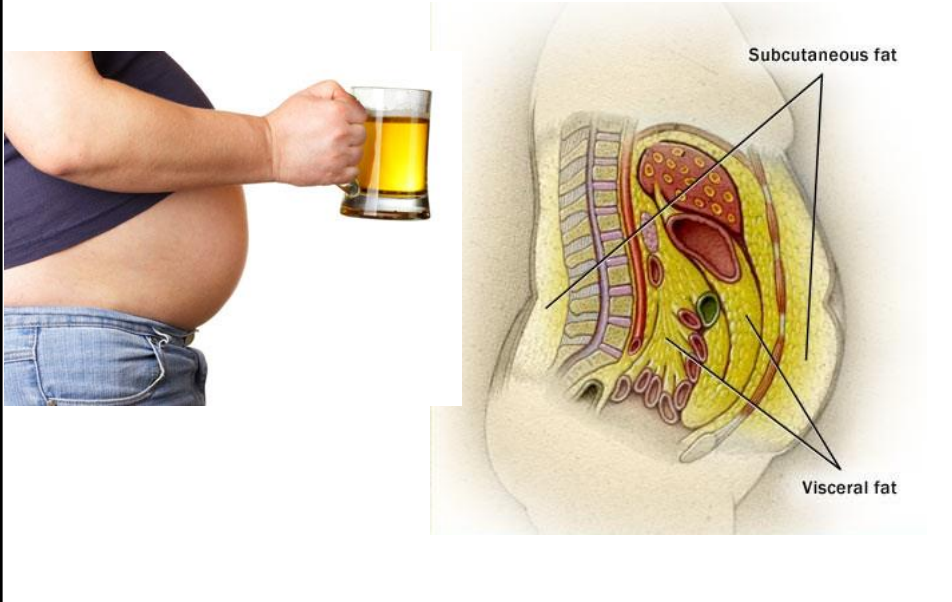


Adapted from: Redman, et al. 1976; Mancia, et al. 1983; Kobrin, et al. 1984; Baumgart, et al. 1989; Imai, et al. 1990; Portaluppi, et al. 1991.

Risk Factors for Essential Hypertension

- Genetics (ethnic variation)
- Obesity
- Insulin resistance
- High alcohol intake
- High salt intake (in salt-sensitive patients ($\approx 25\%$ population))
- Ageing
- Sedentary lifestyle
- Psychosocial stress
- Low potassium intake

Body Weight vs Body Shape



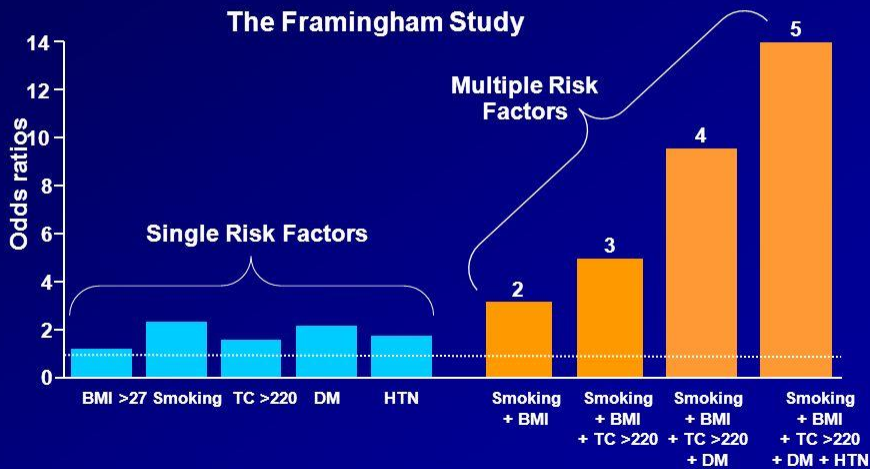
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Arteriosclerosis: The consequences of chronic hypertension



Cardiovascular risk factors – overview



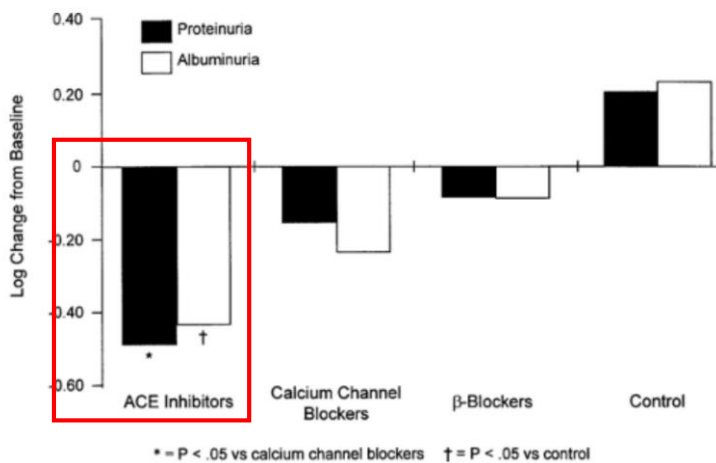
BMI = body mass index; TC = total cholesterol; DM = diabetes mellitus; HTN = hypertension.
 Wilson PWF *et al.* *Circulation*. 1998;97:1837–1847.

The impact of risk factor modification in Type 2 DM

Intervention	Number of CV events prevented for every 1000 people treated over 5 years
0.9% HbA1C reduction	8
1mmol/L cholesterol reduction	23
10/5mmHg BP reduction	29

NICE MeReC bulletin 2011;21:5

ACE inhibition significantly reduces the progression of diabetic nephropathy (which is not only the leading cause of end stage renal disease but also a major cardiovascular risk factor)



Meta-analysis indicating the effect of various antihypertensive agents on proteinuria and albuminuria in type 1 and type 2 diabetes. ACE, angiotensin-converting enzyme. Arch Intern Med 2000;160:1585-1594

The consequences of chronic hypertension

- **Vessel wall changes (arteriosclerosis → atherosclerosis)**
 - Ischaemia eg CAD, PVD
 - Plaque rupture
 - Aneurysms
 - Dissection
- **Target organ damage**
 - **Downstream:**
 - **Eye:** Hypertensive retinopathy
 - **Brain:** Haemorrhage, Infarction and dementia
 - **Kidney:** Nephrosclerosis → CKD
 - **Upstream:**
 - **Heart:** LVH → HFpEF → HFReEF

NICE Highlights: When to start pharmacological Rx

Assessing cardiovascular risk and target organ damage

- All patients with BP > 140/90 should undergo a formal estimation of cardiovascular risk:
 - Q-RISK2 to assess 10 year risk
- Assess for target organ damage:
 - **Urinalysis:** Proteinuria, ACR, haematuria
 - **Bloods:** U&E, creatinine, eGFR, lipids, HbA1c
 - **ECG:** LVH, AF, ischaemic changes
 - **Fundoscopy:** Retinopathy

NICE Highlights: When to start pharmacological Rx

- If < 80 years with stage 1 hypertension with ≥ 1 of
 - target organ damage
 - established cardiovascular disease
 - CKD
 - diabetes
 - $\geq 10\%$ 10 year CVD risk

QRISK2 10 year CV Risk

ClinRisk

Welcome to the QRISK[®]2-2017 risk calculator: <https://qrisk.org>

This calculator is only valid if you do not already have a diagnosis of coronary heart disease (including angina or heart attack) or stroke/transient ischaemic attack.

[Reset](#) [Information](#) [Publications](#) [About](#) [Copyright](#) [Contact Us](#) [Algorithm](#) [Software](#)

About you

Age (25-84):

Sex: Male Female

Ethnicity:

UK postcode: leave blank if unknown

Postcode:

Clinical information

Smoking status:

Diabetes status:

Angina or heart attack in a 1st degree relative < 60?

Chronic kidney disease (stage 4 or 5)?

Atrial fibrillation?

On blood pressure treatment?

Rheumatoid arthritis?

Leave blank if unknown

Cholesterol/HDL ratio:

Systolic blood pressure (mmHg):

Body mass index

Height (cm):

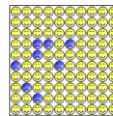
Weight (kg):

Your results

Your risk of having a heart attack or stroke within the next 10 years is:

8.2%

In other words, in a crowd of 100 people with the same risk factors as you, 8 are likely to have a heart attack or stroke within the next 10 years.



Your score has been calculated using the data you entered.

Your body mass index was calculated as 30.1 kg/m².

JBS3 Heart Age Assessment

JBS3 Cardiovascular Risk Assessment

Profile Heart Age Healthy Years Outlook more

Profile

Date of Birth: Day: 1, Month: 1, Year: 1979

Gender: male female

Ethnic group: Indian

Height (m): 1.70 (5' 7" (67.0")) Weight (kg): 87.0 (192.1 lb) BMI: 30.1

Townsend quintile (3 if unknown): 5: Least affluent

Do you smoke? No

Total Cholesterol: 6.5 mmol/L

HDL Cholesterol: 0.8

NonHDL Cholesterol: 5.7

Systolic Blood Pressure: 160 mm Hg

Have you received blood pressure treatment?

Do you suffer from diabetes?

Does a close relative under 60 suffer from CVD?

Do you have a chronic kidney disease?

Have you suffered atrial fibrillation?

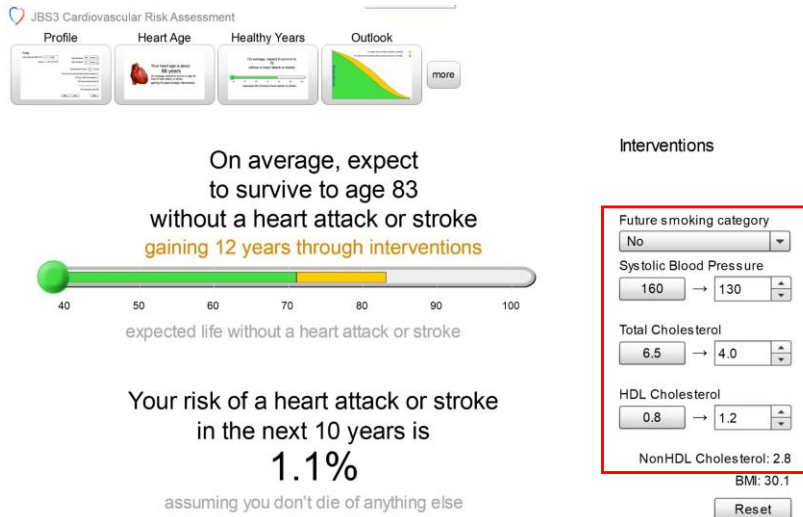
Do you have rheumatoid arthritis?

I have never suffered from Cardiovascular Disease

I have read the [terms and conditions](#)

Save Load Next

JBS3 Healthy Years Gained

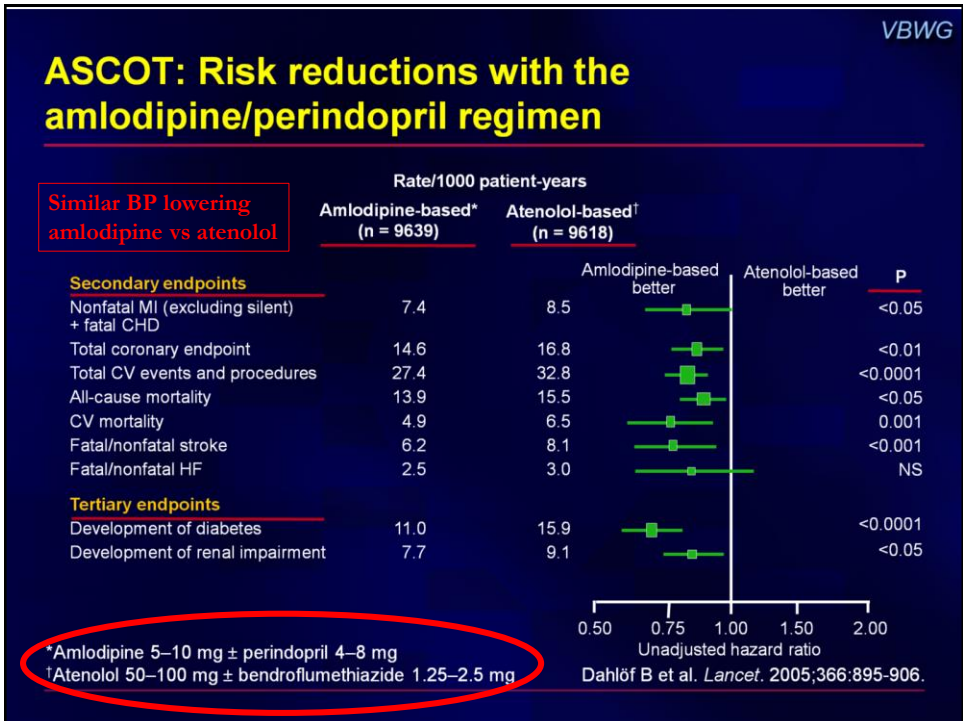
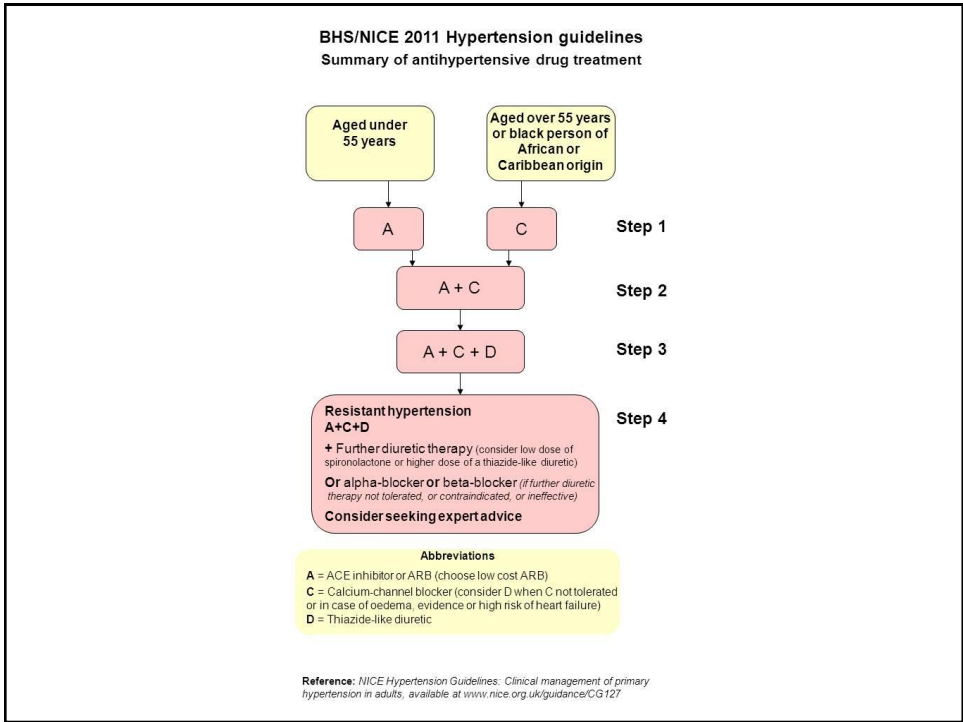


NICE Highlights: When to start pharmacological Rx

- If < 80 years with stage 1 hypertension with ≥ 1 of
 - target organ damage
 - established cardiovascular disease
 - CKD
 - diabetes
 - ≥ 10% 10 year CVD risk
- Any age with stage 2 hypertension
- **Consider starting antihypertensive drug treatment if > 80 years with stage 1 hypertension (use clinical judgement of frailty or multimorbidity)**

Blood Pressure Targets

- **NICE Draft 2019:**
 - **< 135/85** if < 80 years
 - **< 145/85** if > 80 years (use clinical judgement of frailty or multimorbidity)
- **ESC Guidelines 2018:**
 - aim for < 140/90, then proceed to **< 130/80** if < 65, but no lower than 120/70)



NICE Highlights: Antihypertensive Rx

- **Step 1:**

- **ACE-I/ARB** if:
 - Type 2 DM
 - < 55 years and not of African or Caribbean ethnicity
- **CCB** if:
 - > 55 years or African or Caribbean ethnicity

- **Step 2:**

- Early combination of **ACE-I/ARB and CCB** (better to be on lower doses of both than high dose of one).
- ARB preferred over ACE-I in non-diabetic African or Caribbean patients

NICE Highlights: Antihypertensive Rx

- **Step 3:**

- **Thiazide like diuretic**
 - Eg **indapamide** or **chlorthalidone**
 - If already on thiazide diuretic eg bendroflumethiazide or hydrochlorothiazide and well controlled continue current Rx
- If BP still not to target ensure optimal doses and adherence. If still not to target classify as **“Resistant Hypertension”**

- **Step 4:**

- If confirmed resistant hypertension, consider adding a 4th drug or seeking expert advice
- Consider **spironolactone 25mg** if $K^+ \leq 4.5$ (caution in low eGFR)
- Otherwise use **alpha or beta blocker**
- If BP remains uncontrolled with resistant hypertension taking optimal tolerated doses of 4 drugs, seek expert advice

Isolated Systolic Hypertension (ISH)

- ISH ($\geq 160/ < 90$ mmHg) occurs in $> 50\%$ of patients over age 60
- Due to aortic and larger artery stiffening (\downarrow compliance)
- ISH and wide pulse pressure in elderly people increase CV risk
- Treatment leads to a reduction in CV events
- Pharmacological Rx should be initiated if systolic BP ≥ 160 mmHg despite non-pharmacologic measures
- SHEP trial: Rx of ISH with chlorthalidone stepped-care therapy for 4.5 years associated with longer life expectancy at 22 yrs FU
- NICE:
 - ISH patients should be offered the same treatment as patients with both raised systolic and diastolic blood pressure
 - similar benefits from treatment to other patients with raised blood pressure

Accelerated Hypertension (previously known as Malignant Hypertension)

Urgent specialist **same day assessment** if:

- **Clinic BP $\geq 180/120$ with retinal haemorrhage or papilloedema**
- **Suspected pheochromocytoma** (labile or postural hypotension, headache, palpitations, pallor, abdominal pain or diaphoresis)
- **Red flag symptoms:**
 - new onset confusion,
 - chest pain
 - signs of heart failure
 - acute renal impairment

Management: Specialist Referral

- **Specialist investigations required if suspected secondary hypertension:**
 - **Resistant hypertension**
 - > 180 systolic and/or 120 diastolic
 - Sudden-onset high blood pressure before age 30 or after age 55
 - No FHx of high blood pressure
 - No obesity

Secondary Causes of Hypertension:

- **Renal:**
 - **Renovascular disease** (renal artery stenosis)
 - **Polycystic Kidney Disease**
 - **CKD**
- **Coarctation** (congenital)
- **Pregnancy**
- **Endocrine:**
 - **Cushings disease or syndrome** (pituitary ACTH secreting adenoma/glucocorticoids)
 - **Hyperaldosteronism** (eg Conn's syndrome/CAH) ($\uparrow \text{Na}^+/\text{H}_2\text{O}$ $\downarrow \text{K}^+$)
 - **Phaeochromocytoma:** adrenal tumour secreting adrenaline/noradrenaline (spikes in BP)
 - **Hyperparathyroidism**
 - **Acromegaly**
 - **Hyperthyroidism**

Secondary Causes of Hypertension:

- **Drugs**
 - COCP
 - Venlafaxine
 - NSAIDs
 - Steroids
 - MAOIs (Rx of depression and Parkinson's)
 - Liquorice (aldosterone receptor)

Familial Hypercholesterolaemia

- Autosomal dominant
 - Heterozygous FH:
 - 1 in 500 ~ 110,000 in the UK (**85% undiagnosed!!!!!!**)
 - >50% risk of coronary heart disease in men by the age of 50 years
 - ≥30% in women by the age of 60 years, if untreated
 - Homozygous FH:
 - Rare ~ 1 in 10⁶
 - Symptoms appear in childhood, associated early death from coronary heart disease
- Cardiovascular risk algorithms underestimate CV risk in patients with FH (arteries exposed to high LDL from early childhood)

Diagnosis of FH

- **Simon Broome Criteria:**

	Total Cholesterol	LDL Cholesterol
Child / Young Person < 16 yrs	> 6.7 mmol/L	> 4.0 mmol/L
Adult	> 7.5 mmol/L	> 4.9 mmol/L

Definite FH:

- Extreme lipid profile and tendon xanthomas (20% never develop xanthomas)
or
LDL-receptor mutation, familial defective Apo B-100 or PCSK9 mutation (73% of FH cases have an identified gene mutation)

Likely FH:

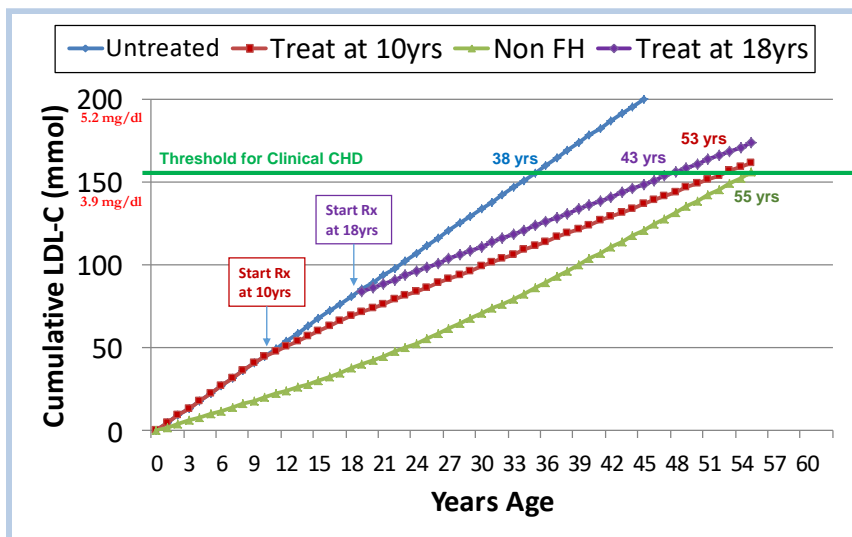
- Extreme lipid profile and
 - FHx of early MI (<50 yrs in 2^o or <60 yrs in 1st degree relative)
 - or
 - FHx of extreme lipid profile: (>7.5 mmol/L 1st or 2nd degree relative or > 6.7 mmol/L in child, brother or sister aged younger than 16 years)



Lipid lowering therapy for FH

- Lifelong lipid lowering therapy
- Statins should be initial treatment
- Target LDL < 50% from baseline (high intensity statin)
- Ezetimibe only if statin intolerant or as add on
- PCSK9 Inhibitors
- All patients with homozygous FH should be under specialist care

Trajectory for patients with FH



NICE recommends Rx initiation by age 10 to obtain a normal life expectancy

Heart 2016;102:1003-1008

Key Points

- **Increasing prevalence:**
 - vast majority of cases are > 45 yrs old; 78% of > 75 yr olds
 - Most patients remain either undiagnosed or undertreated
- **Improved outcomes with treatment:**
 - 50% reduction in heart failure
 - 40% reduction in stroke
- **Diagnosis:**
 - ABPM (or HBPM) if elevated clinic readings > 140/90
 - Lower ABPM cut off (Average daytime: > 135/85)
- **Monitoring:**
 - HBPM