- 1/3 of adult population have HTN.
- 1/2 of them are unaware.
- 1/4 do not take their medication, which is fine if they are happy with the fact that for every 10mmHg above target, they are 38% increased risk of stroke, and 18% increased risk of heart risk.

Hypertension

References:
1. BMJ Investigating hypertension in a young person, 2009
2. CKS.
3. GP Update.
4. PULSE conference, Dr Yassir Javaid,Birmingham
5. PULSE conference, Dr Roger Henderson, 2020
6. Dr Richard McManus, Webinar Oct 2020
7. NB Medical podcast review Jan 2021
8. Is there something up your sleeve? J Hypertension Sept 2020

SBP < 140 OR DBP < 90

- Repeat in 5 yr.
- However, if close to this cut off, repeat sooner.

Coarctation of the aorta:
- Significant difference in BP in left and right arm.
- Absent or weak femoral pulses.
- Radio-femoral delay.
- Palpable collateral blood vessels in the back muscles
- Suprasternal murmur radiating through to the back.

SBP 140-179 OR DBP 90-119

- Ensure regular pulse. If irregular do not use automated machine as can be inaccurate.
- If measuring manual BP and heart sounds continue all the way to zero, measure the diastolic as occuring when the sounds become muffled.

- Measure in both arms.
- If > 20 difference, repeat BP in both arms.
- If still > 20 difference, use arm with highest reading from now on, and tell pt to always get measured in that arm.

- If suffering from falls or dizziness, measure sitting and standing BP.
- If systolic drop of ≥ 20, then tell pt to always get BP measured standing up.

- Measuring over clothes only adds about 2mmgHg and is better than rolling up sleeve and making a tight tourniquet.

- Repeat 2-3 x over next few weeks or months.
- If persistently ≥ 140/90 perform ABPM/HBPM.
- Will also detect white coat hypertension = a discrepancy of more than 20/10 mmHg between clinic and average daytime ABPM or average HBPM.

ABPM:
- Predicts CV outcomes better than HBPM and clinic BP monitoring.
- Having labile BP is not safe i.e. white coat HTN. Keep a close eye on them.
- If the night time dip in BP is missing do annual ABPM as they will get HTN.

HBPM:
- Minimum 4 days, ideally 7.
- Two readings in morning and two evening.
- One min apart.
- Discard the first day of readings.
- Average remaining values.

Hodgkinson et all:
- Tested 332 pt monitors from 7 practices.
- 76% passed all tests.
- 12% failures due to cuff.
- 12% failures due to monitor over estimating BP (which is better than unders estimating !).
- Up to 4 yrs old moniotirs only 5% failed, Vs 26% if older.
- Cheap, old, unvalidated monitors with large cuffs more likely to fail.

- Never wrist unless cannot use upper arm monitor.
- If do use wrist, make sure wrist is level with heart.

< 135/85

135 - 149 / 85 - 94

- Fundoscopy.
- Urine dip for haematuria.
- UEs.
- LFTs.
- Lipids.
- HbA1c.
- ACR.
- ECG.

ACR
- Looking for end organ damage i.e. ACR ≥ 30

ECG
- Looking for end organ damage i.e. evidence of LVH
- S (V1 or V2) + R (V5 or V6) ≥ 35mm.
- R>11mm aVL
- any chest lead ≥ 45mm
- R≥12mm lead I
- R≥20mm aVF

- Exclude 2o causes if any following:

- < 40 yr.
- Sudden worsening.
- Uncontrolled on 3 medications.
- Accelerated hypertension.
- FHx stroke < 50y.

Investigations

- Alcohol and drug use.
- Renal bruit.
- Fundoscopy.
- Urine dip for blood and protein, ACR.
- UEs.
- Plasma aldosterone:plasma renin ratio.
- ECG.

- 1o hyperaldosteronism is most common form of 2o hypertension.
- Only 1/3 of these will have frank hypokalaemia.
- 2/3 have K+ at the lower end of normal range, and Na+ at the upper end of normal range.

- Highly suggestive of 1o hyperaldosteronism if any following:
- Ratio > 750 aldosterone to renin.
- Aldosterone > 400 pmol/L.

- Calculate QRISK to decide if need to start medication.
- Note: not required if ≥ 150 / 95 as you will have already started treatment.

< 10% AND No end organ damage

- No drugs recomended.

≥ 10% OR end organ damage OR established CVD/diabetes/renal disease

- Start antihypertensive.

≥ 150 / 95

- Start antihypertensive.
- Investigations (see left).

SBP ≥ 180 OR DBP ≥ 120

rule out

- Radial-radial delay (aortic dissection).
- Radial-femoral delay (Coarctation of the aorta).

Hypertension

- Start antihypertensive STAT.
- Investigations (see below).

Accelerated hypertension

- Papilloedema.
- Retinal haemorrhages.

Life-threatening symptoms

- Chest pain.
- Confusion.
- Heart failure.

Phaeochromocytoma

- Labile/postural hypotension.
- Headache.
- Sweating attacks.
- Palpitations.
- Pallor.
- Abdominal pain.
- Unexplained fever.

- Medical referral STAT.

- 24 hour urinary catecholamines. OR
- Plasma metanephrines.

- Phaeochromocytoma or paragangliomas.
- Plasma metanephrine testing is much more sensitive but limited availability of test.

- Avoid consumption of caffeine, nuts, and chocolate for 24 hrs before and during urine collection.

- Renal USS.

- Only really useful if abnormal urine.

- CXR.
- Echo.

- Only shows LVH if hypertension is longstanding.

- Renal MR angiogram.

- Only perform if no renal artery bruit, and primary hyperaldosteronism and phaeochromocytoma tests are negative.
- In renal MRA usually radiologist can also comment on renal parenchyma & adrenal masses etc (phaeochromocytoma)

- MRI cardiac including aorta
- MRA aorta.

- Cardiac MRI (including aorta is performed as one study) MRA aorta can be done with or without contrast.

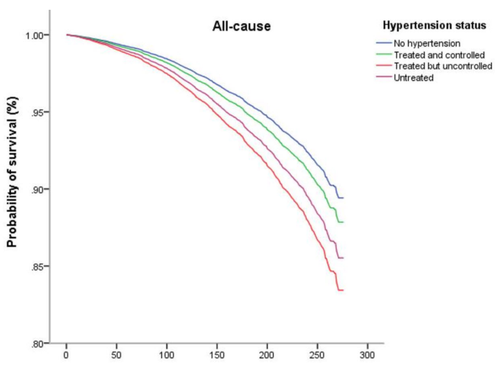
Management

Lifestyle changes

- ↓ wt.
- ↓ alcohol (including binge drinking).
- Quit smoking.
- ↓ caffeine.
- ↓ salt (usually in processed foods, 4g/day).
- ↑ activity.
- ↓ stress.

Uncontrolled hypertension increases risk of all-cause and cardiovascular disease mortality in US adults: the NHANES III Linked Mortality Study

Scientific Reports volume 8, Article number: 9418 (2018)



Antihypertensive.

- 2 in 3 people are not treated to target.
- Look at chart to left. Your worse off with treated but uncontrolled HTN, compare to not being on treatment at all !
- Keep it simple.
- No need to follow that old algorithm A/B & C/D based on age and black/caucasian. Amlodipine as good as ACEi in most pt's.
- If achieving good BP control on one drug you can almost guarantee they never had HTN in the first place.
- Nearly every pt needs 2 or 3 drugs to maintain BP control.
- Strong evidence that taking at night is more effective.
- If < 80y target BP < 140/90 (HBPM < 135/85)
- If ≥ 80y target BP < 150/90 (HBPM < 145/85)

CCB

- Just start Amlodipine 5mg at night (less ankle oedema) in all pt's unless diabetic or CKD where you need to protect the kidney.

if fails*

* Check adherence before adding more and more medications.

Add ACEi

if fails

Add indapamide

if fails

Add spironolactone

- Add doxazocin OR - Add beta blocker

- K+ ≤ 4.5

K ≥ 4.6

if fails

Referral.

- 2o care will:
- Confirm BP.
- Tackle contributory factors.
- Investigate for 2o causes.
- Discontinue medications which ↑ BP.
- Optimise HTN medications.

- Cuff too small = ↑ 10/8 mmHg
- Cuff over clothing = ↑ 3
- Back/arm/leg unsupported = ↑ 10/11
- Leg crossed = ↑ 8
- Talking/listening = ↑ 10/10
- Distended bladder = ↑ 15/10
- Smoked within 30min = ↑ 20
- Pain = ↑ 30
- Not rested = ↑ 20

- Resistant HTN risk factors:
- Non adherence.
- ↑ age.
- ↑ BMI.
- Excess salt.
- Excess alcohol.
- CKD.
- DM.
- Black.
- LVH.

- Amiloride.
- Nitrates.
- Hydralazine.
- Moxonidine.
- Loop diuretics.
- Methyldopa.

Renal

Chronic pyelonephritis:
Usually detected unexpectedly on USS when investigating hypertension.

Diabetic nephropathy:
Microalbuminuria or proteinuria.

Glomerulonephritis:
Microscopic haematuria.

Polycystic kidney disease:
Abdominal or flank mass, microscopic haematuria, or family history.

Obstructive uropathy:
Abdominal or flank mass.

Renal cell carcinoma:
Haematuria, loin pain and a loin mass.

Vascular

Coarctation of the aorta.

Renal artery stenosis:
Peripheral vascular disease and an abdominal bruit, or if resistant hypertension.

Endocrine

Primary hyperaldosteronism:
Hypokalaemia, sodium > 140 mmol/L, or a drop in potassium with with indapamide. Rarely tetany, muscle weakness, nocturia, or polyuria.

Phaeochromocytoma:
Intermittently high or labile BP, or postural hypotension, headaches, sweating attacks, palpitations, or unexplained fever and abdominal pains.

Cushing's syndrome:
Truncal obesity and striae etc. It rarely presents as hypertension alone.

Acromegaly:
Enlargement of hands and feet, facial changes, sweating.

Hypothyroidism:
Alters RAAS. Fatigue, weight gain, dry skin and hair loss, constipation, and muscle weakness.

Hyperthyroidism:
Tremor, anxiety, sweating, weight loss, diarrhoea, and heat intolerance.

Drugs

Alcohol misuse. Variable hypertension that is resistant to drugs and that disappears within a 2/52 of complete abstinence.

Cocaine and other substances of abuse.

COC.

Corticosteroids.

NSAIDs.

Venlafaxine.

Ciclosporin/tacrolimus.

Amlodipine CCB dihydropyridine
- Start 5mg OD.
- Titrate up in 4/52 (if necessary) to 10mg OD.
- Usual dose 5 10mg OD.
- Maximum 10mg OD.

Contraindications/cautions

Heart failure:
- Dihydropyridines should not be initiated in people with uncontrolled heart failure.
- Amlodipine may be used cautiously in stable heart failure.

Cardiac outflow obstruction:
- e.g. significant aortic stenosis or obstructive hypertrophic cardiomyopathy.
- Vasodilatation may result in ↓ cardiac output.

Atenolol
- Start 25mg OD.
- Titrate up every 4 weeks (if necessary).
- Usual dose 25 50mg OD.
- Maximum 100mg OD.
- Check HR and BP 2 4 weeks after each dose increase, and at least annually once stable.

Contraindications/cautions

- Asthma.
- 2o or 3o atrioventricular block.
- Pulse < 60.
- BP <100 systolic.
- Peripheral arterial disease.

Diltiazem CCB rate limiting
- Elderly, hepatic or renal impairment: Start 120 200mg OD.
- Others: Start 180 240mg OD.
- Maximum 200 360mg OD.

Contraindications/cautions

Heart failure:
- Verapamil and diltiazem should not be used in people with heart failure.

Cardiac outflow obstruction:
- e.g. significant aortic stenosis or obstructive hypertrophic cardiomyopathy.
- Vasodilatation may result in ↓ cardiac output.

2 atrioventricular block:
- Verapamil and diltiazem may induce complete atrioventricular block.

Hepatic impairment:
- Use low doses of diltiazem and verapamil in impaired liver function.

Renal impairment:
↓ dose of diltiazem and verapamil in renal impairment.

Doxazosin standard release
- Start 1mg OD (take first dose at night).
- Titrate by doubling dose every 4/52.
- Usual dose 4mg OD.
- Maximum 16mg OD.

Indapamide
- Start 2.5mg OD.
- No titration.
- Repeat UEs 4-6/52.

Contraindications/cautions

- Gout.
- Refractory hyponatraemia, hypokalaemia, hypercalcaemia.
- Severe hepatic impairment.
- eGFR < 30.
- Pregnancy.

Deranged Cr

- If ↑ Cr by < 30 % from baseline:
No action required.

- If ↑ Cr 30-50 %, or Cr > 200, or eGFR < 30:
Assess clinical hydration status.
If hypovolaemic, then stop.
Repeat UEs in 2/52.

- If ↑ Cr by > 50 %, or > 256, or eGFR ≤ 25:
Assess clinical hydration status, BP, proteinuria, UEs.
If hypovolaemic stop.

Deranged K

If at risk of arrhythmia:
- If < 4, consider stopping.
- If < 3.5 seek urgent advice.

Not at risk of arrhythmia:
- If < 3, consider stopping.
- If < 2.5, seek urgent advice.

- Taking dgoxin.
- Taking drugs that prolong the QT interval.
- Paroxysmal arrhythmia
- Unstable angina
- Chronic liver disease.

Ramipril
- Start 1.25mg OD.
- Titrate up every 4 weeks. Although can titrate up every week if significant HTN and want to control quickly.
- Usual dose 2.5 5mg OD.
- Maximum 10mg OD.
- Repeat UEs in 1-2/52, and 1-2/52 after each dose increase.
- Check BP 4 weeks after each dose increase.

Deranged Cr

- If ↓ eGFR by < 25%, or ↑ Cr by < 30 % from baseline:
Continue same dose and repeat in 1-2/52.

- If ↓ eGFR by ≥ 25 %, or ↑ Cr by ≥ 30%:
Assess clinical hydration status.
Stop certain drugs.

- If despite these measures there is still a persisting ↓ in eGFR or ↑ in Cr, then either stop, or ↓ to a previously tolerated dose and repeat UEs in 5-7/7 (may have to introduce an alternative antihypertensive if required).

- NSAIDs
- CCB, nitrates
- Potassium supplements
- Amiloride
- Spironolactone

Spironolactone

- UEs before starting to ensure K ≤ 4.5.
- Repeat within 1/12 after starting.
- Then monthly for 2/12.
- Then every 3/12 for 1 yr.
- Them every 6/12 thereafter.
* After each ↑ dose.
* Stop if K+ > 5.