

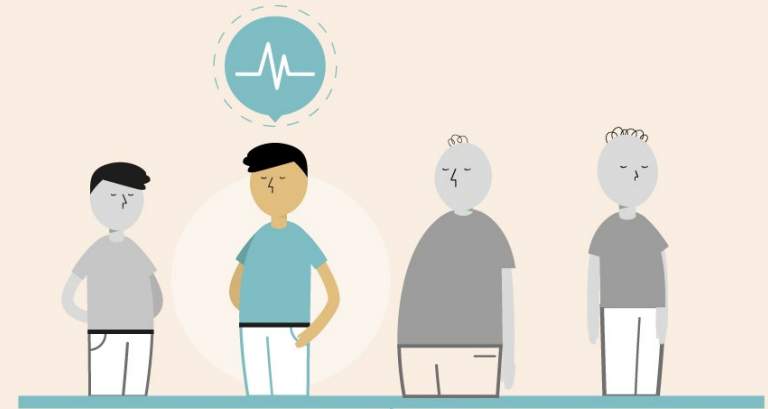
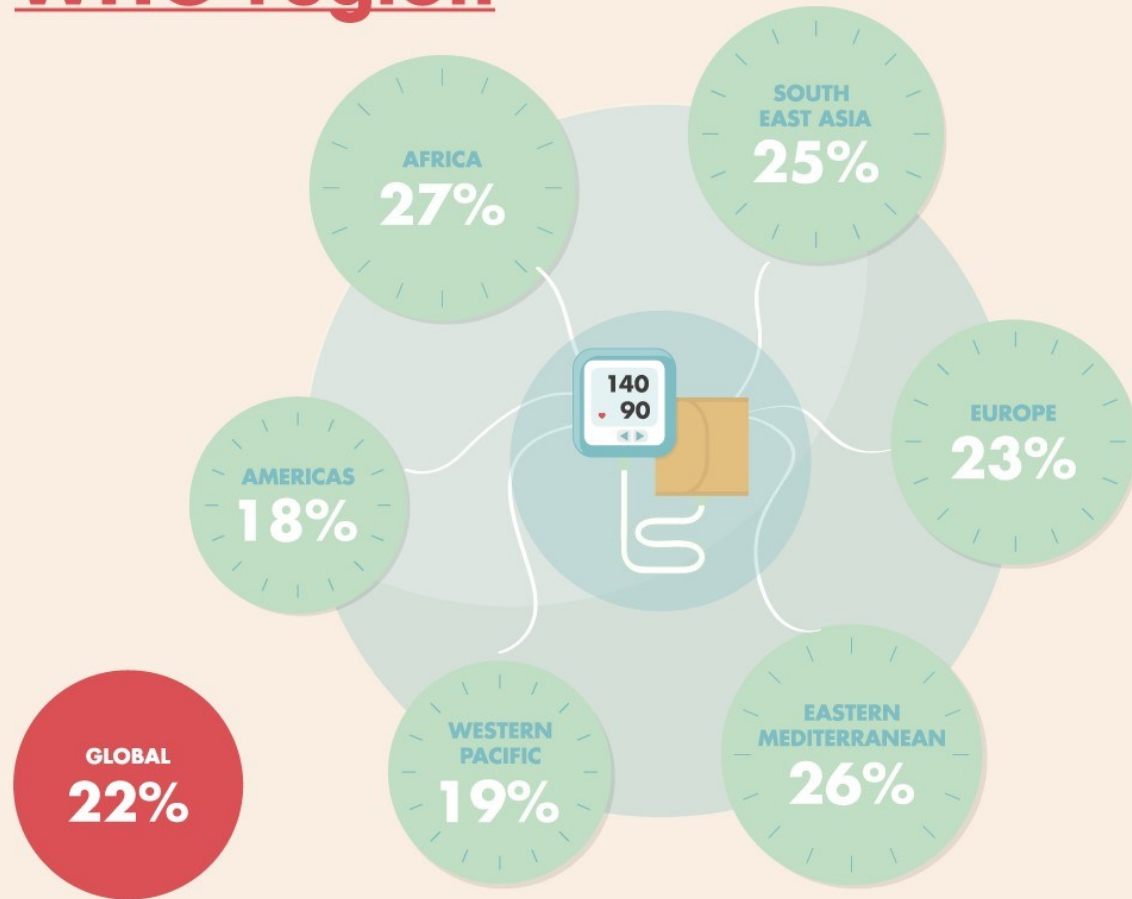


CVD
PREVENTION
ISLAND

AtheroSclerotic CardioVascular Disease Prevention

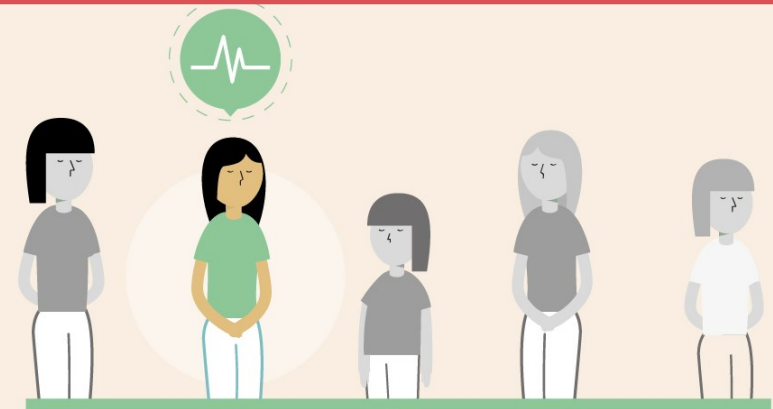
Dr. Alireza Moarref
Associate Professor of Cardiology,
Shiraz University of Medical Sciences

Hypertension prevalence by WHO region



1 in 4

men have hypertension



1 in 5

women have hypertension



**International
Society of
Hypertension**

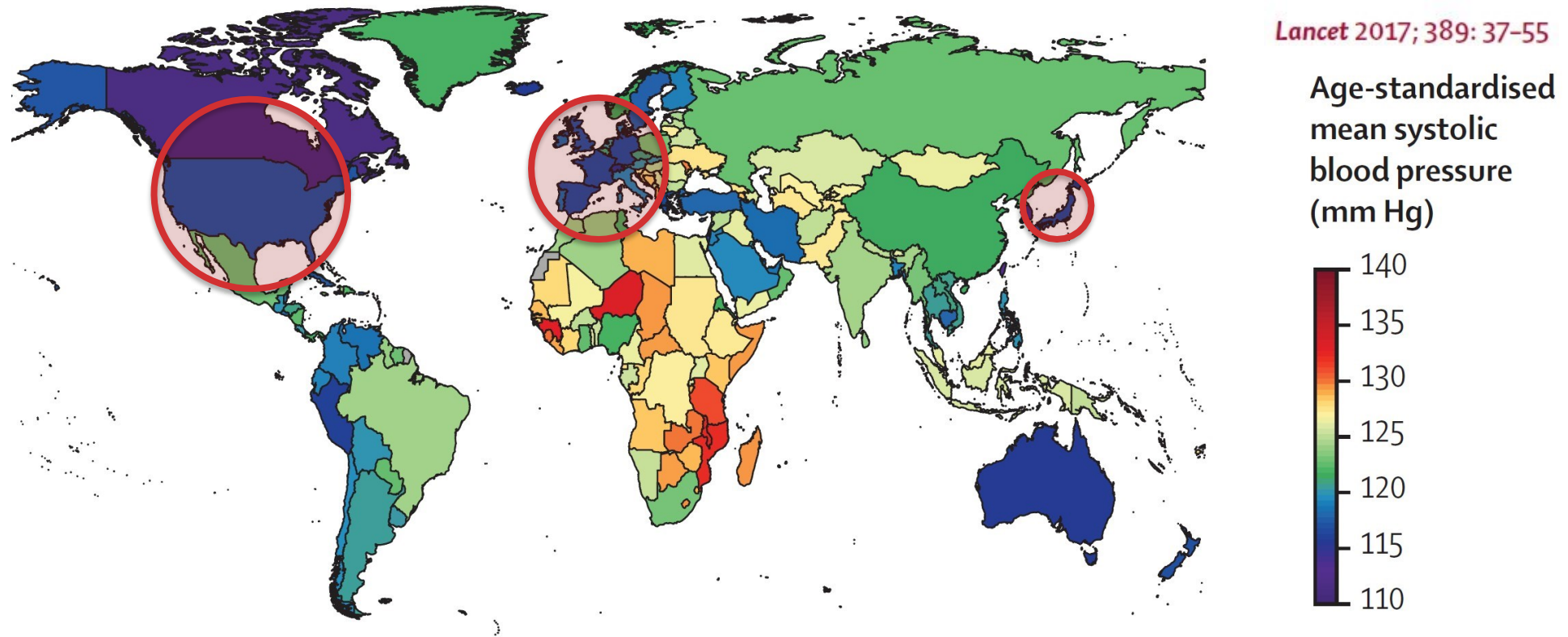
2020 ISH Global Hypertension Practice Guidelines

6th May 2020

www.ish-world.com



Introduction



- 1.39 billion estimated with hypertension in 2010
- **349** million from HIC
- **1.04 billion** from LMIC

Circulation. 2016;134:441-450



Introduction

Herein optimal care refers to ***evidence-based standard*** of care articulated in recent guidelines and summarized here, whereas **ESSENTIAL** standards recognize that **OPTIMAL** standards would not always be possible. Hence essential standards refer to minimum standards of care.



2020 ISH Global Hypertension Practice Guidelines

1. to be used globally
2. to be fit for application in low-resource and high- resource settings by advising on **ESSENTIAL** and **OPTIMAL** standards of care; and
3. to be concise, simplified and easy to use by clinicians, nurses and community health workers, as appropriate.



Definition of Hypertension

ESSENTIAL

Classification of hypertension based on Office blood pressure (BP) measurement

Category	Systolic (mmHg)		Diastolic (mmHg)
Normal BP	< 130	and	< 85
High-normal BP	130 - 139	and/or	85 - 89
Grade 1 Hypertension	140 - 159	and/or	90 - 99
Grade 2 Hypertension	≥ 160	and/or	≥ 100



Definition of Hypertension

Category	Systolic (mmHg)		Diastolic (mmHg)
Normal BP	< 130	and	< 85
High-normal BP	130–139	and/or	85–89

High-normal BP is intended to identify individuals who could benefit from lifestyle interventions and who would receive pharmacological treatment if compelling indications are present.



Definition of Hypertension

Grade 1 Hypertension	140–159	and/or	90–99
Grade 2 Hypertension	≥ 160	and/or	≥ 100

Individuals identified with confirmed hypertension (grade 1 and grade 2) should receive appropriate pharmacological treatment.



Definition of Hypertension

ESSENTIAL

Hypertension based on Office-, Ambulatory (ABPM)- and Home Blood Pressure (HBPM) measurement

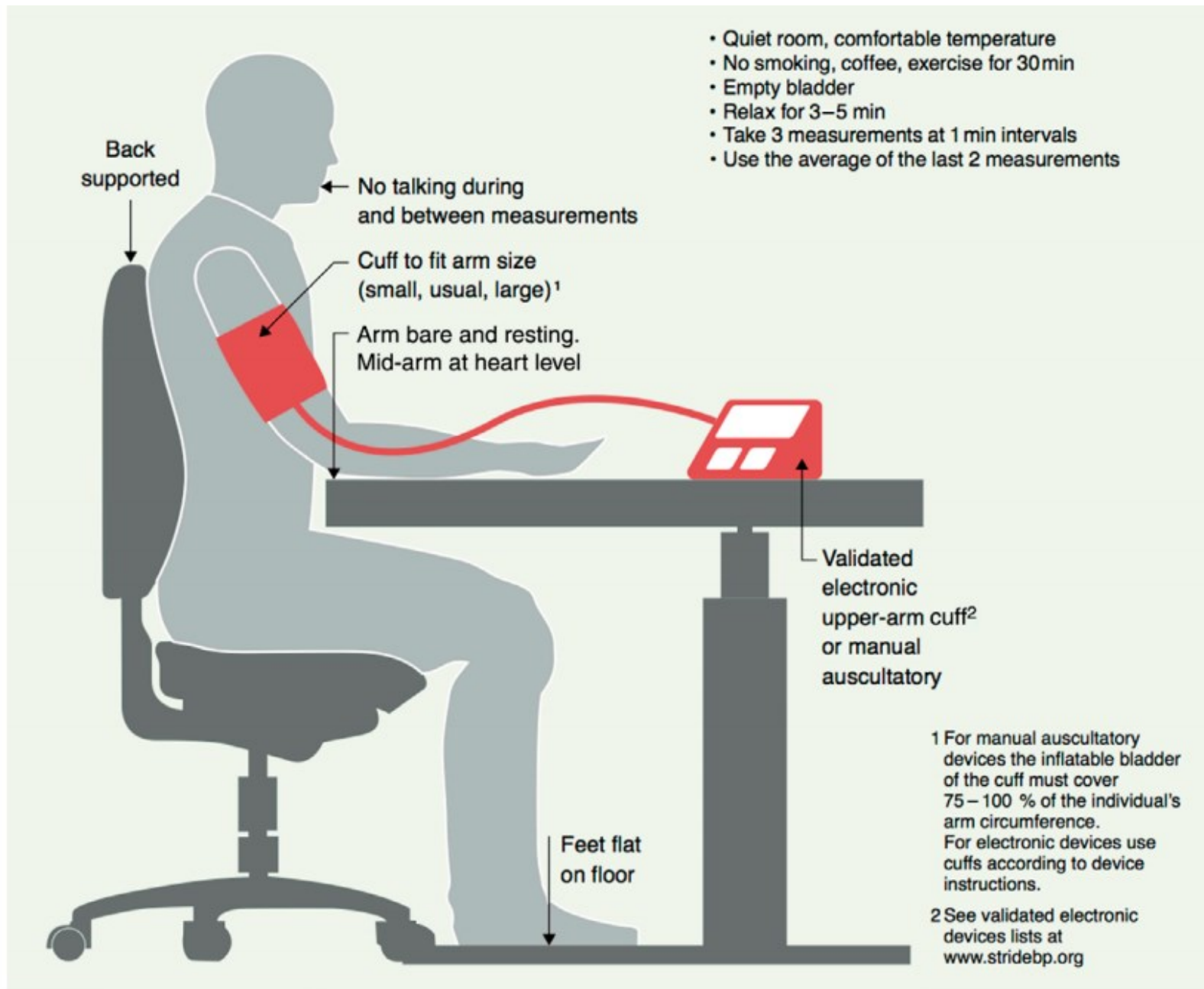
		SBP / DBP (mmHg)
Office BP		≥ 140 and/or ≥ 90
ABPM	24h average	≥ 130 and/or ≥ 80
	Day Time (or awake) average	≥ 135 and/or ≥ 85
	Night Time (or asleep) average	≥ 120 and/or ≥ 70
HBPM		≥ 135 and/or ≥ 85



Blood Pressure Measurement and Diagnosis of Hypertension

- 2-3 office visits at 1-4-week intervals.
- Whenever possible, the diagnosis should not be made on a single visit (unless BP \geq 180/110 mmHg and CVD).
- If possible and available the diagnosis of hypertension should be confirmed by out- of-office measurement.

ESSENTIAL





Blood Pressure Measurement and Diagnosis of Hypertension

OFFICE BP MEASUREMENT

Conditions	Device	Protocol
Position	Cuff	Interpretation
<ul style="list-style-type: none">• Setting• Body position• Talking	<ul style="list-style-type: none">• Validated electronic upper-arm cuff (www.stridebp.org)• Alternatively manual auscultatory device• Cuff size	<ul style="list-style-type: none">• Average 2nd-3rd measurement• 2-3 office visits required



Blood Pressure Measurement and Diagnosis of Hypertension

BP Measurement Plan according to Office BP levels

Office blood pressure levels (mmHg)		
<130/85	130-159/85-99	>160/100
<ul style="list-style-type: none">• Remeasure within 3 years (1 year if other risk factors).	<ul style="list-style-type: none">• If possible confirm with out-of-office measurement.• Alternatively confirm with repeated office visits.	<ul style="list-style-type: none">• Confirm within a few days/weeks.



Blood Pressure Measurement and Diagnosis of Hypertension

OPTIMAL

Office Blood Pressure

Initial evaluation

- Measure BP in both arms. Difference >10 mmHg: use arm with higher BP; >20 mmHg: consider further investigation.

Standing BP

- In treated patients when symptoms of postural hypotension.
- At first visit in elderly and diabetics.

Unattended BP

- More standardized. Lower BP levels with uncertain threshold.
- Out-of-office BP again needed in most cases.



Out-of-Office Blood Pressure Measurement

	Home BP Monitoring	Ambulatory BP Monitoring
Conditions	As for office blood pressure (<i>see above</i>).	Routine working day.
Position	As for office BP (<i>see above</i>).	Avoid strenuous activity. Arm still and relaxed during each measurement.
Device	Validated electronic (oscillometric) upper-arm cuff device (www.stridebp.org , and Section 11: Resources)	
Cuff	Size according to the individual's arm circumference	
Measurement protocol	Before each visit to the health professional: <ul style="list-style-type: none">• 3–7-day monitoring in the morning (before drug intake if treated) and the evening.• Two measurements on each occasion after 5 min sitting rest and 1 min between measurements. Long-term follow-up of treated hypertension: <ul style="list-style-type: none">• 1–2 measurements per week or month.	<ul style="list-style-type: none">• 24-hour monitoring at 15 – 30 min intervals during daytime and nighttime.• At least 20 valid daytime and 7 nighttime BP readings are required. If less, the test should be repeated.
Interpretation	<ul style="list-style-type: none">• Average home blood pressure after excluding readings of the first day ≥ 135 or 85 mmHg indicates hypertension.	<ul style="list-style-type: none">• 24-hour ambulatory blood pressure $\geq 130/80$ mmHg indicates hypertension (primary criterion).• Daytime (awake) ambulatory blood pressure $\geq 135/85$ mmHg and nighttime (asleep) $\geq 120/70$ mmHg indicates hypertension



Blood Pressure Measurement and Diagnosis of Hypertension

White-coat Hypertension

- Intermediate CV risk.
- If low total CV risk and no organ damage, drug treatment may not be prescribed.
- Follow with lifestyle changes.

Masked Hypertension

- Similar CV risk as sustained hypertensives.
- Drug treatment may be required aiming to normalise out-of-office BP.



Diagnostic and Clinical Tests

ESSENTIAL

- **Medical History** (BP, risk factors, co-morbidities, signs/symptoms of secondary hypertension...)
- **Physical Examination** (circulation, heart, other systems)
- **Lab Investigations** (Na⁺, K⁺, creatinine, eGFR, dipstick lipids, Fasting Glucose where available)
- **12 lead ECG** (AF, LV hypertrophy, IHD...)

OPTIMAL

- **Additional tests to consider** (extended biochemistry, cardiac/kidney/brain/vascular imaging, fundoscopy...)



Exacerbators & Inducers of Hypertension

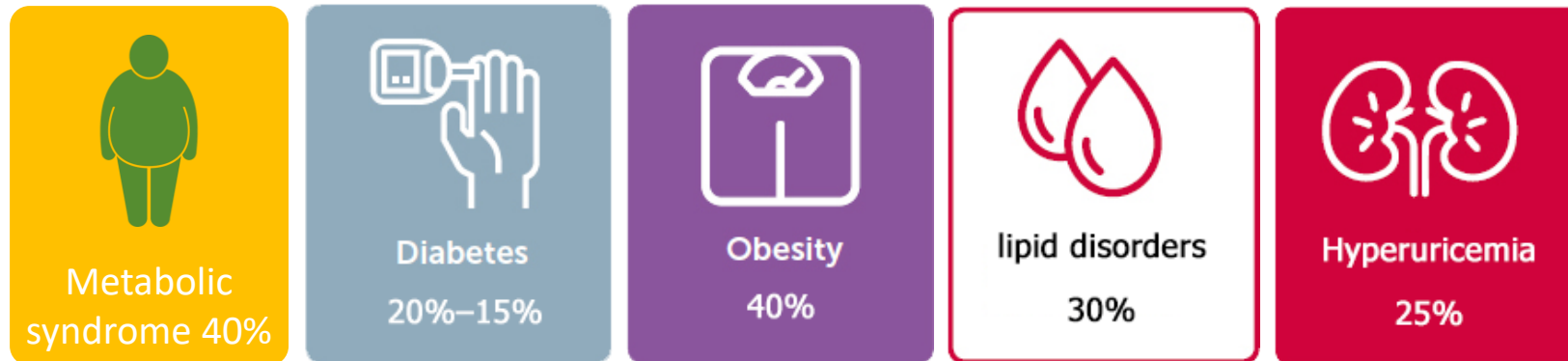
Most common medications that can increase BP

- Non-selective or traditional NSAIDs
- Combined oral contraceptive pill
- Select anti depressant medications including tricyclic antidepressants and SNRIs
- Acetaminophen when used almost daily and for prolonged periods
- Alcohol raises BP regardless of the type of alcoholic drink.



Cardiovascular Risk Factors

- 50% < hypertensive patients have additional CV risk factors.
- The most common additional risk factors are:





Cardiovascular Risk Factors

Other Risk Factors, HMOD, or Disease	High-Normal SBP 130–139 DBP 85–89	Grade 1 SBP 140–159 DBP 90–99	Grade 2 SBP \geq 160 DBP \geq 100	
No other risk factors	Low	Low	Moderate	High
1 or 2 risk factors	Low	Moderate	High	
\geq 3 risk factors	Low	Moderate	High	High
HMOD, CKD grade 3, diabetes mellitus, CVD	High	High	High	



HMOD Assessment

ESSENTIAL

- Serum creatinine
- eGFR
- Dipstick urine test
- 12-lead ECG

OPTIMAL

- Brain
- Eyes
- Heart
- Kidneys
- Arteries

Serial assessment of HMOD

may help to determine efficacy of treatment

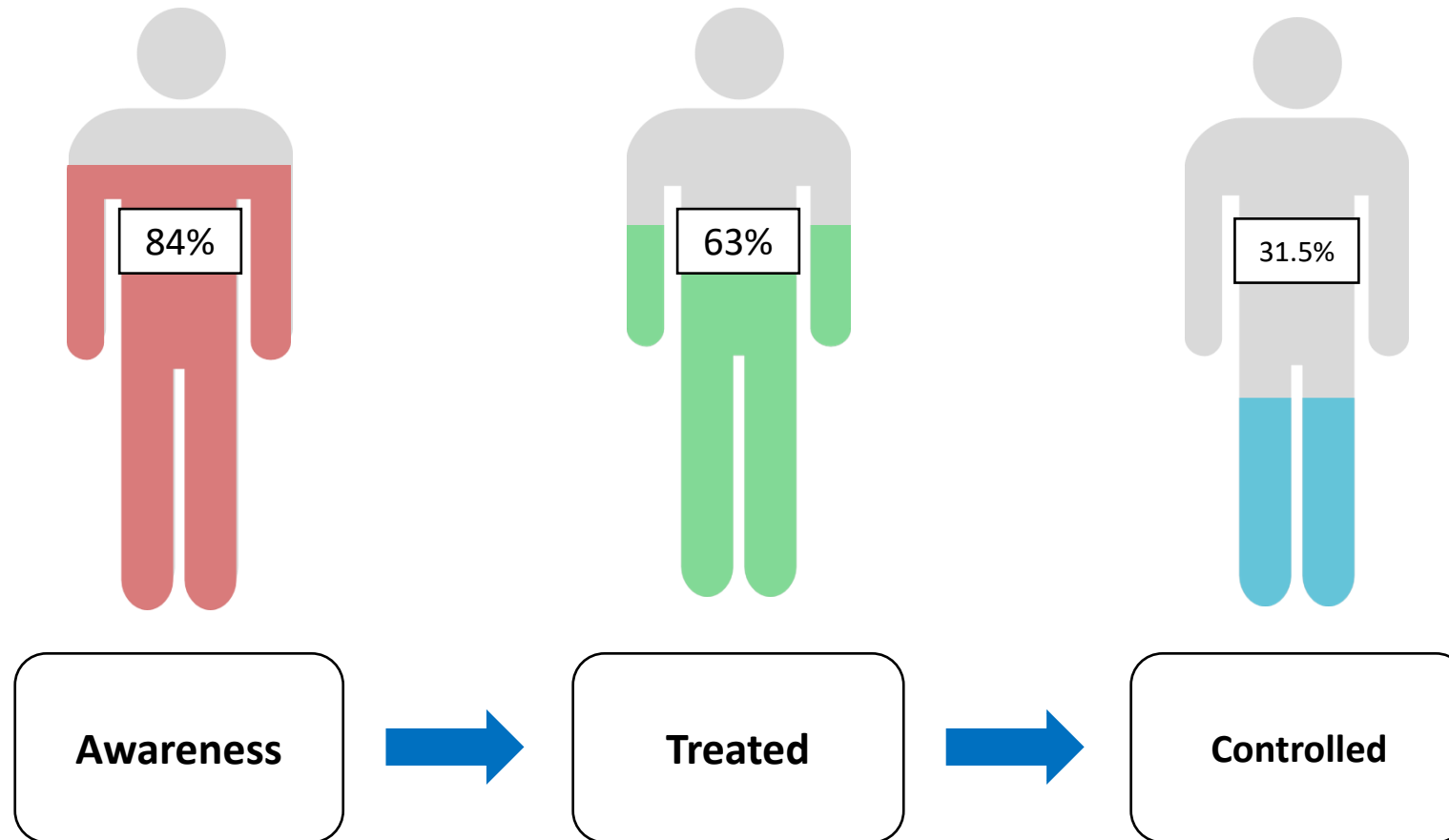


CVD
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Treatment of Hypertension

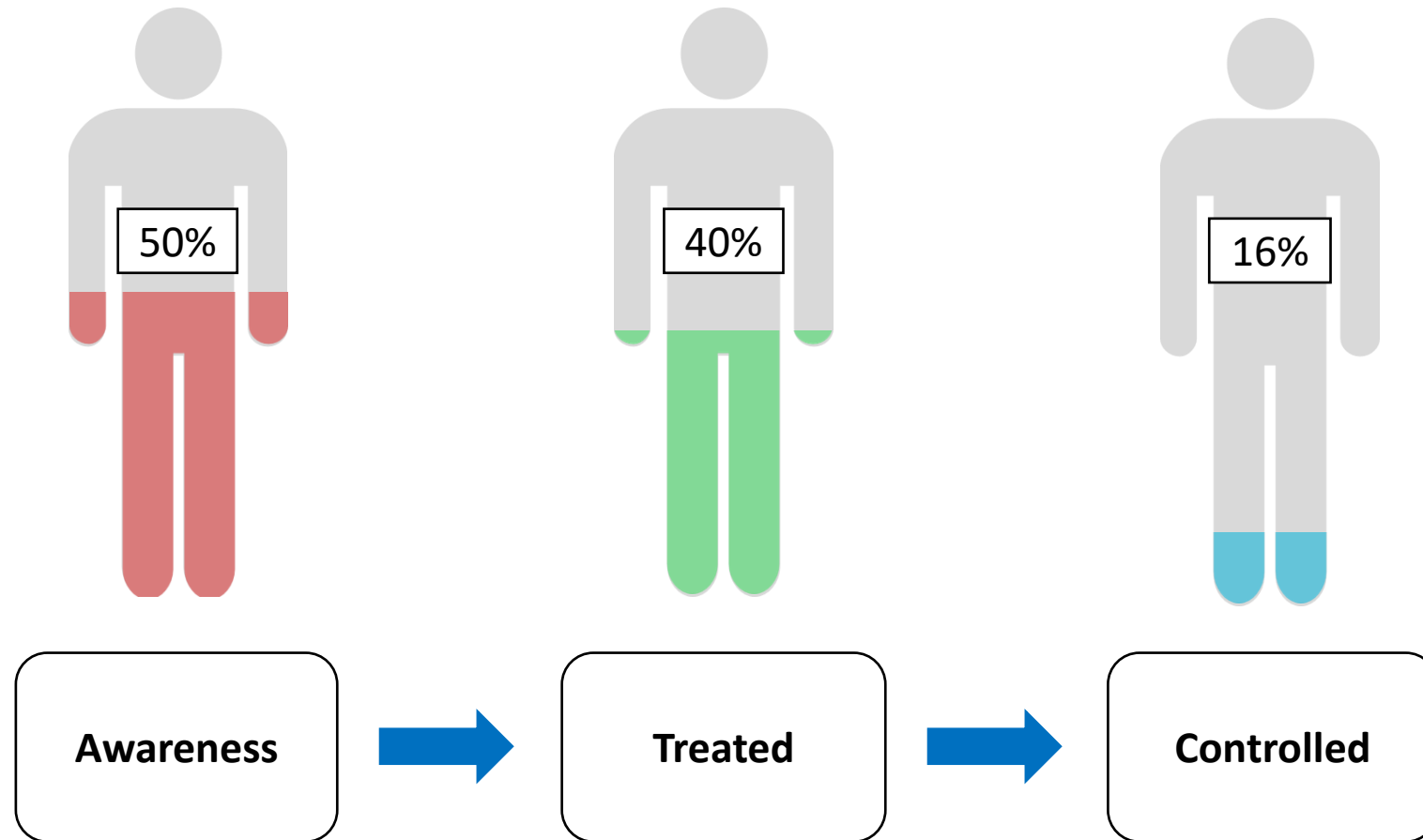


Hypertension in the U.S.





Hypertension in Iran



A 10 mm Hg reduction in systolic blood pressure can significantly reduce risk of several conditions:

**Coronary
Heart Disease**

17%
reduced
risk

Stroke

27%
reduced
risk

**Heart
Failure**

28%
reduced
risk








Treatment of hypertension

- Lifestyle changes
- Pharmacological therapy



Lifestyle Modification

	Modification	Recommendation	Approximate SBP Reduction Range
	Weight reduction	Maintain normal body weight (BMI=18.5-24.9 kg/m ²)	5 mm Hg
	DASH eating plan	Diet rich in fruits, vegetables, low fat dairy and reduced in fat	11 mm Hg
	Restrict sodium intake	<1500 mg of sodium per day	5-6 mm Hg
	Physical activity	Be more physically active. Aim for at least 90 to 150 minutes of aerobic exercise per week.	5-8 mm Hg
	Moderation of alcohol consumption	No more than 2 drinks/day for men and 1 drink/day for women	4 mm Hg

BP = Blood pressure, BMI = Body mass index, SBP = Systolic blood pressure, DASH = Dietary Approaches to Stop Hypertension



Ideal Characteristics of Drug Treatment

1	Treatments should be evidence-based in relation to morbidity/mortality prevention.
2	Use a once-daily regimen which provides 24-hour blood pressure control.
3	Treatment should be affordable and/or cost-effective relative to other agents.
4	Treatments should be well-tolerated.
5	Evidence of benefits of use of the medication in populations to which it is to be applied.



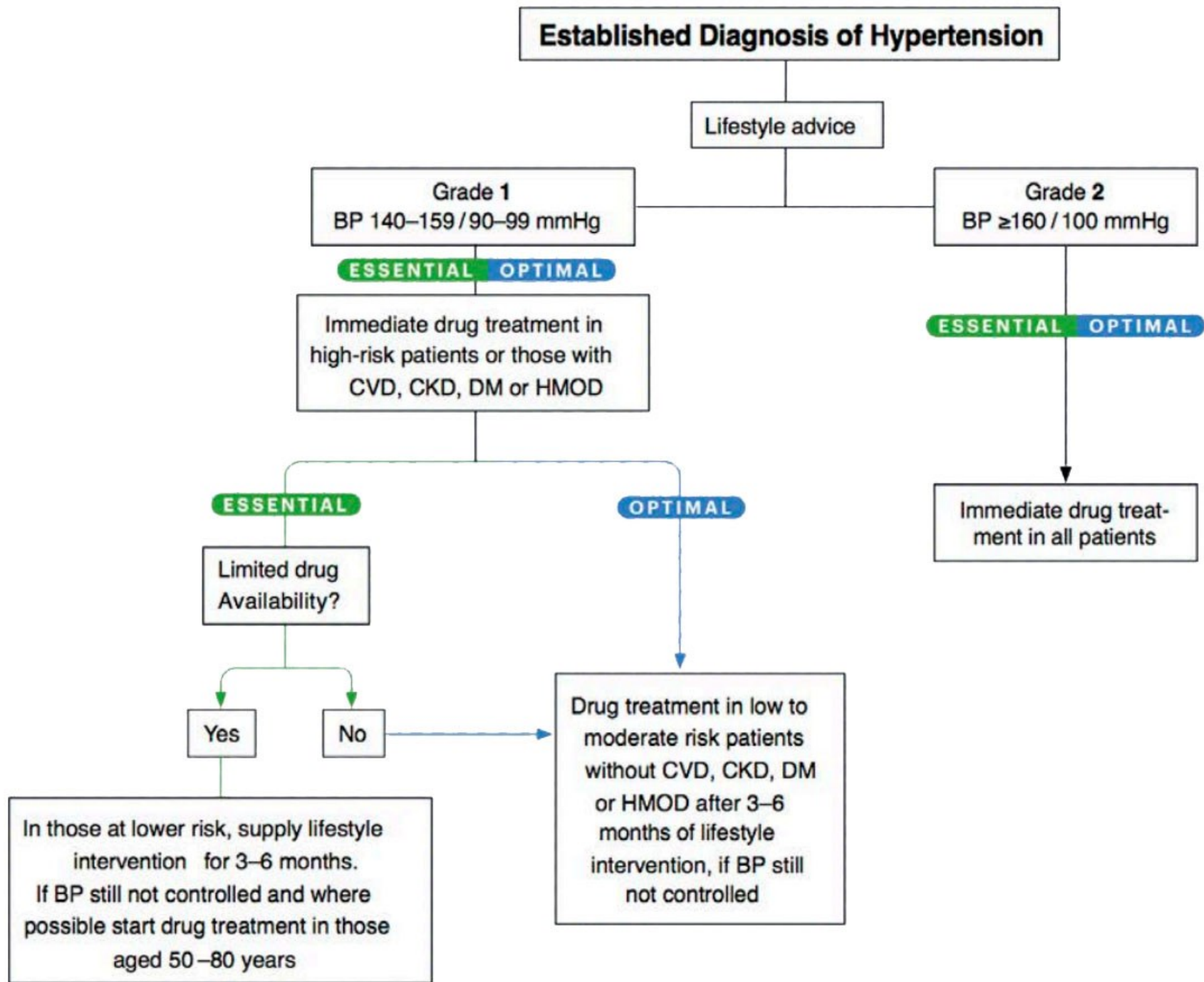
Oral Antihypertensive Drugs

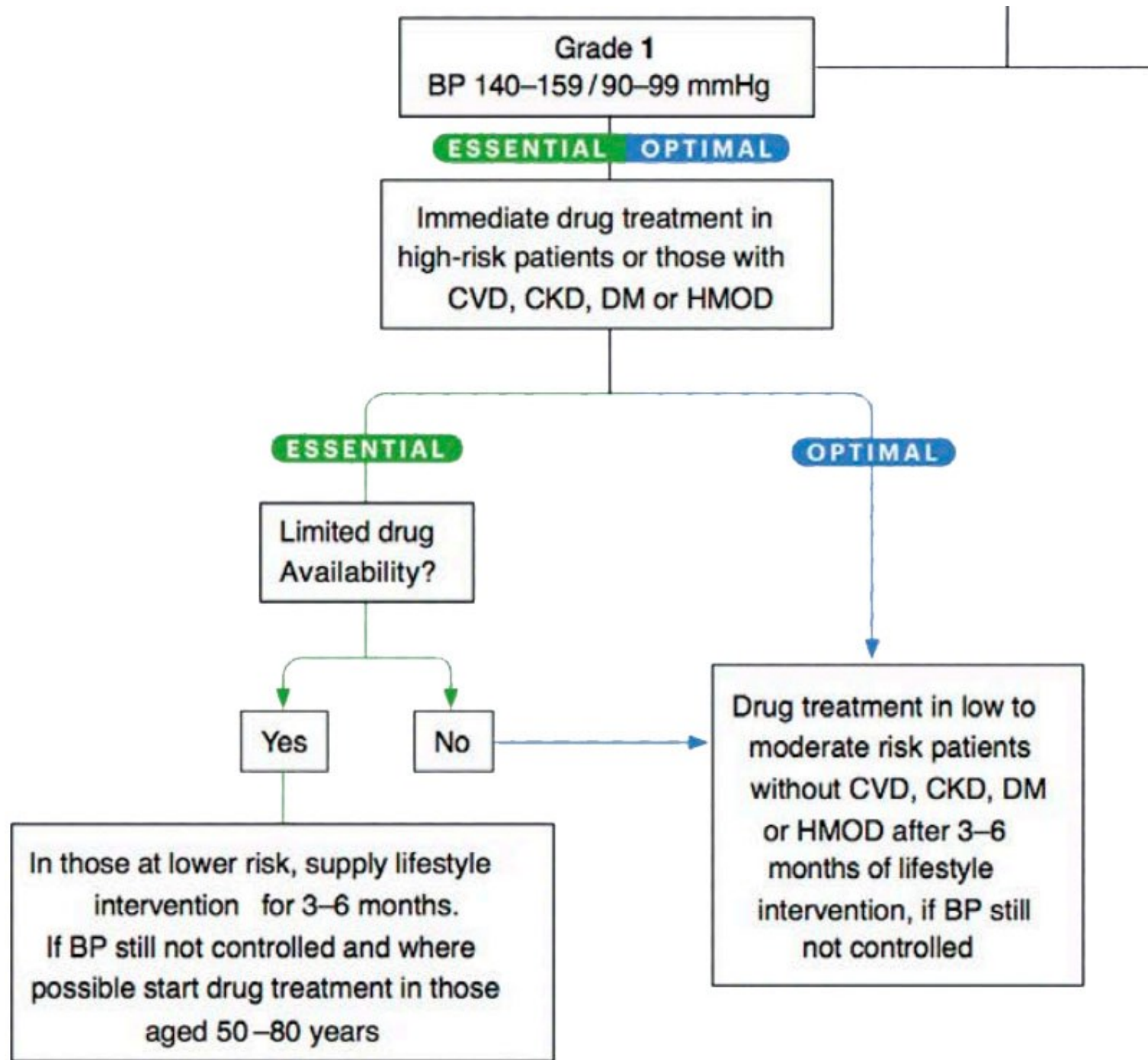
Primary agents

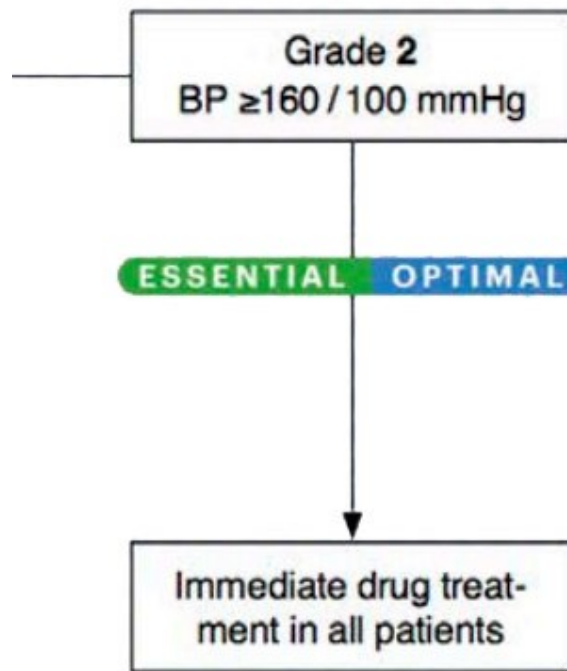
	Class	Drug	Daily Freq.
1	Thiazide or Thiazide-type diuretics	Chlorthalidone	1
		Hydrochlorothiazide	1
		Indapamide	1
2	ACE inhibitors	Benazepril	1 or 2
		Captopril	2 or 3
		Enalapril	1 or 2
3	ARBs	Losartan	1 or 2
		Telmisartan	1
		Valsartan	1
4	CCB dihydropyridines	Amlodipine	1
		Nifedipine LA	1
	CCB nondihydropyridines	Diltiazem SR	2
		Verapamil SR	1 or 2

Secondary agents

Class	Drug	Daily Freq.
Diuretics— loop	Furosemide	2
Diuretics potassium sparing	Amiloride	1 or 2
	Triamterene	1 or 2
Aldosterone antagonists	Spironolactone	1
Beta blockers	Atenolol	
	Bisoprolol	1
	Metoprolol tartrate	2
	Nebivolol	1
	Propranolol IR	2
	Carvedilol	2
Alpha-1 blockers	Terazosin	1 or 2
Central alpha1 agonist	Clonidine oral	2
	Methyldopa	2
Direct vasodilators	Hydralazine	2 or 3







ISH core drug-treatment strategy

**Ideally Single
Pill Combination
Therapy (SPC)**

Step 1
Dual low-dose#
combination

**ACEi or ARB
+
DHP CCB**

Step 2
Dual full-dose
combination

Step 3
Triple combination

**ACEi or ARB
+
DHP CCB
+
Thiazide-like diuretic**

Step 4
(Resistant
Hypertension)
Triple Combination
+ Spironolactone or
other drug

**ACEi or ARB
+
DHP CCB
+
Thiazide-like diuretic
Add Spironolactone
12.5 – 50 mg o.d.**

Consider monotherapy in low-risk grade 1 hypertension or in very old or frailer patients.



**Ideally Single
Pill Combination
Therapy (SPC)**

#low-dose generally refers to half of the maximum recommended dose



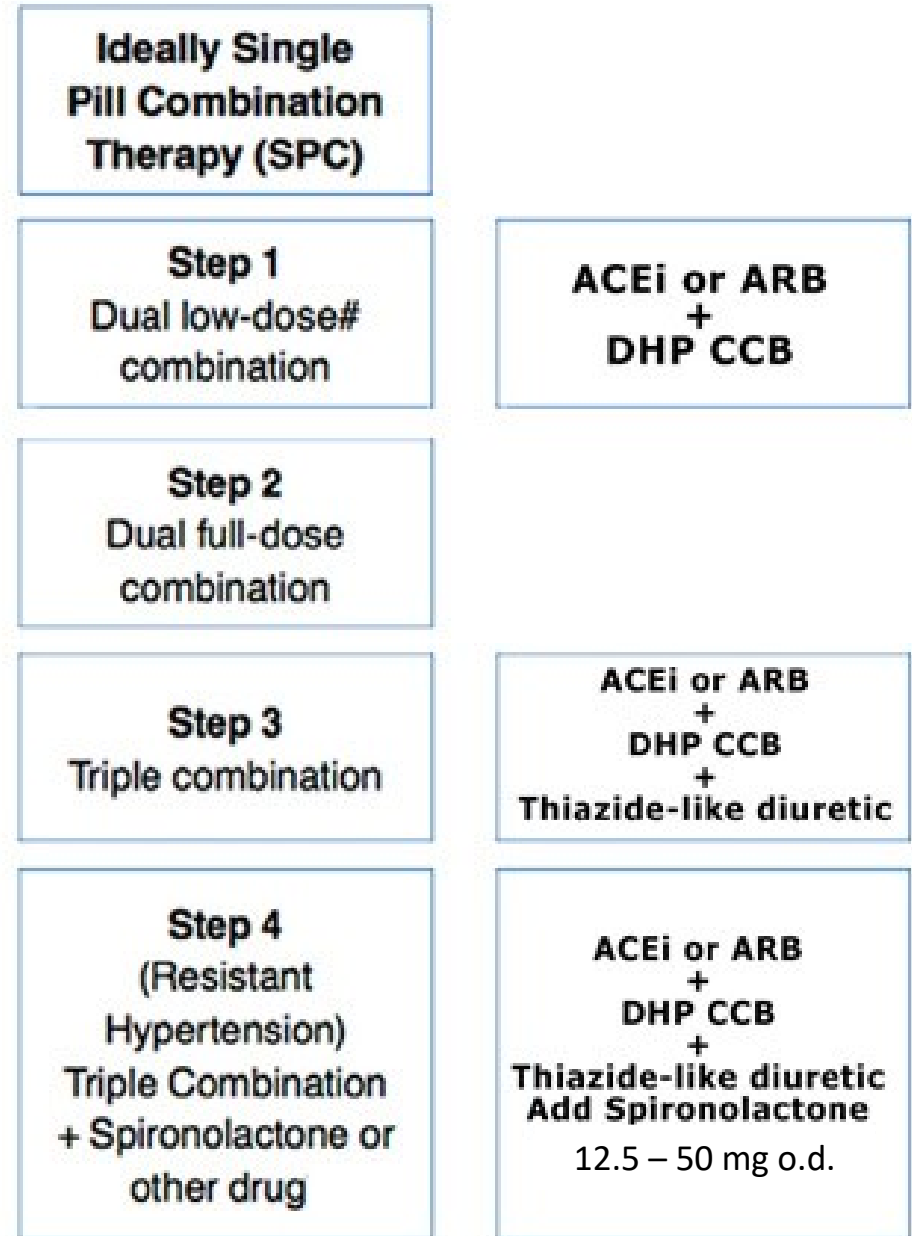
**Step 1
Dual low-dose#
combination**

**ACEi or ARB
+
DHP CCB**



Consider ACEi or ARB + Thiazide in post-stroke, very elderly, incipient HF, or CCB intolerance.

ISH core drug-treatment strategy



Caution with spironolactone or other potassium-sparing diuretics when eGFR <45 ml/min/1.73m² or K⁺ >4.5 mmol/L.



ISH core drug-treatment strategy

ESSENTIAL

- Consider **beta-blockers** at any treatment step when there is a specific indication for their use:
 - heart failure
 - Angina
 - post-MI
 - AF
 - younger women with, or planning pregnancy

**Ideally Single
Pill Combination
Therapy (SPC)**

**Step 1
Dual low-dose#
combination**

**Step 2
Dual full-dose
combination**

**Step 3
Triple combination**

**Step 4
(Resistant
Hypertension)
Triple Combination
+ Spironolactone or
other drug**

**ACEi or ARB
+
DHP CCB**

**ACEi or ARB
+
DHP CCB
+
Thiazide-like diuretic**

**ACEi or ARB
+
DHP CCB
+
Thiazide-like diuretic
Add Spironolactone
12.5 – 50 mg o.d.**

Office blood pressure targets for treated hypertension

ESSENTIAL

Target BP reduction by at least 20/10 mmHg, ideally to <140/90 mmHg

OPTIMAL

<65 years : BP target <130 / 80 mmHg if tolerated (but >120 / 70 mmHg).
≥65 years : BP target <140 / 90 mmHg if tolerated but consider an individualised BP target in the context of frailty, independence and likely tolerability of treatment.

**Aim for
BP control
within 3 months**



Treatment of Hypertension

Adherence to Antihypertensive Treatment

- Nonadherence to antihypertensive treatment affects 10%–80% of hypertensive patients and is one of the key drivers of suboptimal BP control.
- Evaluate adherence to antihypertensive treatment as appropriate at each visit and prior to escalation of antihypertensive treatment.



Treatment of Hypertension

Adherence to Antihypertensive Treatment

ESSENTIAL

Consider the following strategies to improve medication adherence:

1. reducing polypharmacy – use of **single pill combinations**
2. **once-daily dosing** over multiple times per day dosing
3. linking adherence behavior with daily habits
4. providing adherence feedback to patients
5. home BP monitoring
6. reminder packaging of medications
7. empowerment-based counseling for self-management
8. electronic adherence aids such as mobile phones or short messages services
9. multidisciplinary healthcare team approach to improve monitoring for adherence