Training Series- No. 3

Management of Adult Arterial Hypertension

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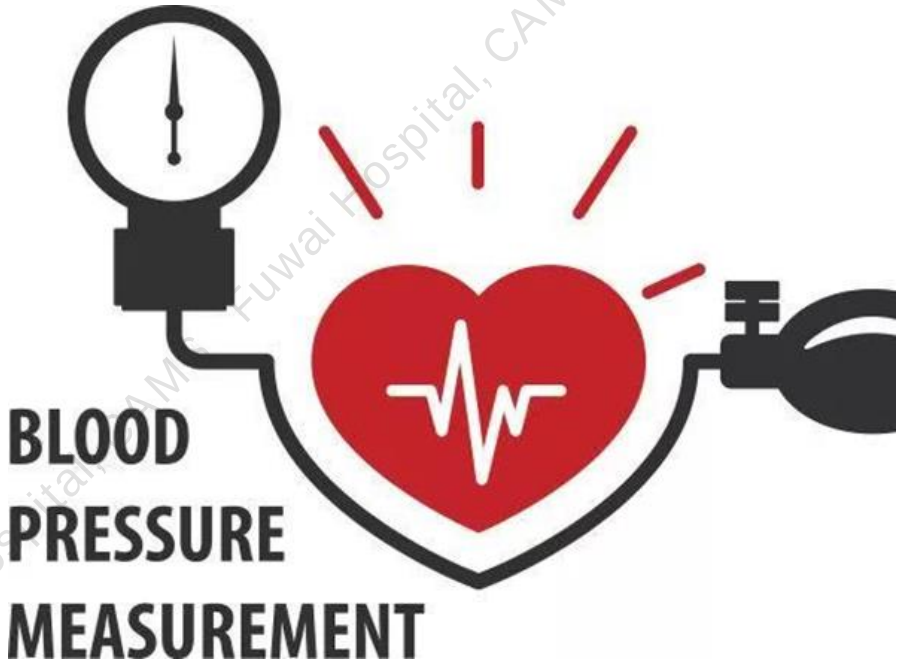
Content

- **Classification and Stratification of Hypertension**
- **Non- Pharmacological Treatment of Hypertension**
- **Pharmacological Therapy for Hypertension**
- **Treatment Procedures for Hypertension**
- **Summary**

Definitions of hypertension

- A clinic systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg without the use of anti-hypertensive medications.

BP Category	SBP	DBP
Normal	<120	<80
High Normal	120~139 and (or)	80~89
Hypertension	≥ 140 and (or)	≥ 90
Grade 1	140~159 and (or)	90~99
Grade 2	160~179 and (or)	100~109
Grade 3	≥180 and (or)	≥110
Isolated Systolic Hypertension	≥140 and	<90



BP = blood pressure; SBP = systolic blood pressure.

a
BP category is defined according to seated clinic BP and by the highest level of BP, whether systolic or diastolic.

b
Isolated systolic hypertension is graded 1, 2, or 3 according to SBP values in the ranges indicated.
The same classification is used for all ages from 16 years.

Definitions of hypertension by office and out-of-office blood pressure levels

BPM method	Diagnosis threshold
Office BP	≥140/90mmHg
ABPM	24h average: SBP/DBP ≥130/80mmHg Daytime average: SBP/DBP ≥135/85mmHg Nighttime average: SBP/DBP ≥120/70mmHg
HBPM	≥135/85mmHg

Risk Stratification

- The strategy of pharmacological treatment depends not only on blood pressure levels, but also on overall cardiovascular risk.
- Comprehensive cardiovascular risk stratification of hypertensive patients is useful for determining the timing of initiating anti-hypertensive therapy, optimizing antihypertensive treatment regimens, establishing more appropriate blood pressure control goals and performing comprehensive management for the patient.

Table- Cardiovascular risk stratification in patients with elevated BP

Other risk factors and medical history	BP, mmHg			
	SBP 130–139 and (or) DBP 85–89	SBP 140–159 and (or) DBP 90–99	SBP 160–179 and (or) DBP 100–109	SBP ≥ 180 and (or) DBP ≥ 110
No other risk factors		Low risk	Moderate risk	High risk
1–2 risk factors	Low risk	Moderate risk	Moderate to high risk	Very high risk
≥ 3 risk factors, TOD or CKD grade 3 or diabetes mellitus without organ damage	Moderate/high risk	High risk	High risk	Very high risk
Clinical complications, or CKD grade ≥ 4, or diabetes mellitus with organ damage	High/very high risk	Very high risk	Very high risk	Very high risk

BP: blood pressure; CKD: chronic kidney disease; DBP: diastolic blood pressure; SBP: systolic blood pressure; TOD: target organ damage.

Risk Stratification

Very high risk	**People with any of the following:**
	Documented CVD, either clinical or unequivocal on imaging. • **Clinical CVD** includes acute myocardial infarction, acute coronary syndrome, coronary or other arterial revascularization, stroke, TIA, aortic aneurysm, and PAD • **Unequivocal documented CVD on imaging** includes significant plaque (i.e. ≥50% stenosis) on angiography or ultrasound; it does not include increase in carotid intima-media thickness • **Diabetes mellitus with target organ damage**, e.g. proteinuria or a with a major risk factor such as grade 3 hypertension or hypercholesterolaemia • **Severe CKD** (eGFR <30 mL/min/1.73 m^2) • **A calculated 10 year SCORE of ≥10%**
High risk	**People with any of the following:** • **Marked elevation of a single risk factor**, particularly cholesterol >8 mmol/L (>310 mg/dL), e.g. familial hypercholesterolaemia or grade 3 hypertension (BP ≥180/110 mmHg) • **Most other people with diabetes mellitus** (except some young people with type 1 diabetes mellitus and without major risk factors, who may be at moderate-risk)
	Hypertensive LVH
	Moderate CKD eGFR 30-59 mL/min/1.73 m^2)
	A calculated 10 year SCORE of 5-10%
Moderate risk	**People with:** • **A calculated 10 year SCORE of ≥1 to <5%** • **Grade 2 hypertension** • **Many middle-aged people belong to this category**
Low risk	**People with:** • **A calculated 10 year SCORE of <1%**

BP = blood pressure; CKD = chronic kidney disease; CVD = cardiovascular disease; eGFR = estimated glomerular filtration rate; LVH = left ventricular hypertrophy; TIA = transient ischaemic attack; PAD = peripheral artery disease; SCORE = Systematic COronary Risk Evaluation.

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Life Style Modification

- Lifestyle interventions are reasonable and effective treatments for any hypertensive patients (including normal high-value patients and hypertensive patients requiring medication) at any time, aim to lower BP, control other risk factors and clinical conditions.
- The main measures include:

-To reduce sodium intake (daily salt intake < 6 g), and increasing potassium intake

-Reasonable meal, balanced diet

-To control body weight to make BMI < 24, and to make waist circumference < 90 cm for male and < 85 cm for female

-Do not smoke, completely quit smoking, and avoid passive smoking

-Do not drink or restrict alcohol

-To increase exercise, medium intensity; 4-7 times per week; 30-60 min each time

-To reduce mental stress and maintain psychological balance

Lifestyle intervention goals and blood pressure reduction effects

Life Style	Target	Obtainable systolic blood pressure reduction
Reduce sodium intake	Daily salt intake per person should not exceed 6 g (one beer bottle cap *). Note the potential salt intake (salted vegetables, soy sauce, etc.)	2~8 mmHg
Weight loss	BMI<24 kg/m2，WC <90 cm (male)，<85 cm (female)	5~20 mmHg/ lose 10 kg of weight
Regular exercise	Medium intensity exercise; 4-7 times per week; 30-60 min each time	4~9 mmHg
Quit smoking	Quit smoking, and avoid passive smoking	-
Stop drinking	Do not drink or restrict alcohol	-
Psychological balance	Reduce mental stress and maintain psychological balance	-

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Basic principles of anti-hypertensive treatment

- All five classes of anti-hypertensive drugs commonly used are suitable for the initiation of anti-hypertensive therapy. It is recommended that the choice of specific drugs should be based on the type of special population and comorbidities so as to the individualized treatment.
- The intimal selection between mono-therapy and combination therapy should be based the baseline BP and the cardiovascular risk factors.
- Ordinary patients start with regular dose, while the elderly is initiated with lower effective therapeutic dose. It can be considered to gradually titrate to the full dosage according to the
- treatment demand.
- It is preferred to use long-acting agents to control 24-h BP, which can prevent cardio- and cerebrovascular complications more effectively.
- It is recommended that high-risk group of patients with BP ≥ 160/100 mmHg or 20/10 mmHg higher than that of the target BP, or patients who receive mono-therapy and do not achieve the goal BP should be treated with combination therapy, including fixed combination preparations or a free combination of two or more agents.
- It is feasible to initiate with small dose combination therapy for patients with BP ≥ 140/90 mmHg

Strong indications for antihypertensive drugs commonly available

Indication	CCB	ACEI	ARB	diuretic	β-blockers
Left ventricular hypertrophy	+	+	+	±	±
Stable CAD	+	+[a]	+[a]	–	+
Post-myocardial infarction	–[b]	+	+	+[c]	+
Heart failure	–[e]	+	+	+	+
Prevention of atrial fibrillation	–	+	+	–	–
Cerebrovascular disease	+	+	+	+	±
Carotid intima-media thickness	+	±	±	–	–
Proteinuria/Microproteinuria	–	+	+	–	–
Renal inadequacy	±	+	+	+[d]	–
Elderly hypertension	+	+	+	+	±
Diabetes	±	+	+	±	–
Dyslipidemia	±	+	+	–	–

Selection of principal anti-hypertensive drugs for clinical practice- CCB

Classes	Indications	Contraindications	
		Absolute	Relative
Dihydropyridines CCB	Elderly hypertension Peripheral vascular disease Isolated systolic hypertension Stable angina pectoris Carotid atherosclerosis Coronary atherosclerosis		Tachydysrhythmia Heart failure
Non-dihydropyridines CCB	Angina pectoris Carotid atherosclerosis Supraventricular tachycardia	A-V block (grade 2 or 3) Heart failure	

Dihydropyridine CCB

Mechanisms- dilates blood vessels and lowers BP by blocking calcium channel on VSMCs

Common side effects include reflex sympathetic activation leading to rapid heartbeat, facial flushing, edema of the ankle, hyperplasia of the gums, etc.

No absolute contraindications. Use with cautions in patients with tachycardia and heart failure.

Selection of principal anti-hypertensive drugs for clinical practice- ACEI/ARB

Classes	Indications	Contraindications		Side effects
		Absolute	Relative	
ACEI inhibit angiotensin-converting enzyme	Heart failure Coronary heart disease Left ventricular hypertrophy Left ventricular dysfunction Prevention of atrial fibrillation Carotid atherosclerosis Non-diabetic nephropathy Diabetic nephropathy Proteinuria/Microproteinuria Metabolic syndrome	Pregnancy Hyperkalemia Bilateral reno-arterial stenosis		Dry cough Hypotension Rash Hyperkalemia
ARB blocking angiotensin II type 1 receptor	Diabetic nephropathy Proteinuria/Microproteinuria Coronary heart disease Heart failure Left ventricular hypertrophy Prevention of atrial fibrillation ACE-inhibitor coughing Metabolic syndrome	Pregnancy Hyperkalemia Bilateral reno-arterial stenosis		Diarrhea Hyperkalemia

Selection of principal anti-hypertensive drugs for clinical practice- Diuretics, β-blockers, α-blockers

Classes	Indications	Contraindications	
		Absolute	Relative
Diuretics (thiazides)	Heart failure Elderly Hypertension Old-aged Hypertension Isolated systolic hypertension	Gout	Pregnancy
Diuretics (loop diuretics)	Renal insufficiency Heart failure		
Diuretics (anti-aldosterone)	Heart failure Post-myocardial infarction	Renal failure Hyperkalemia	
β-blockers	Angina pectoris Post-myocardial infarction Tachydysrhythmia Chronic heart failure	A-V block (grade 2 or 3) asthma	COPD Peripheral vascular disease glucose intolerance Athletes
α-blockers	Prostatic hyperplasia Hyperlipidemia	Orthostatic hypotension	Heart failure

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Goal of hypertension treatment

- The fundamental goal of hypertension treatment is to reduce the overall risk of developing heart, brain, kidney and vascular complications and death.
- The benefits of antihypertensive treatment derive primarily from the BP reduction *per se.*
- On the basis of lifestyle improvement, antihypertensive drugs should be administered according to the overall risk level of hypertensive patients, while intervening in correctable risk factors, target organ damage and coexisting clinical diseases.
- Intensive antihypertensive treatment strategy should be adopted to achieve maximum cardiovascular benefit if conditions allowed.
- Goal of anti-hypertensive treatment: for general hypertensive patients, their BP should be reduced to < 140/90 mmHg (Ⅰ, A),and further lower level (< 130/80 mmHg) could also be applicable if patients can tolerant it or belongs to high-risk category.

Therapeutic strategies

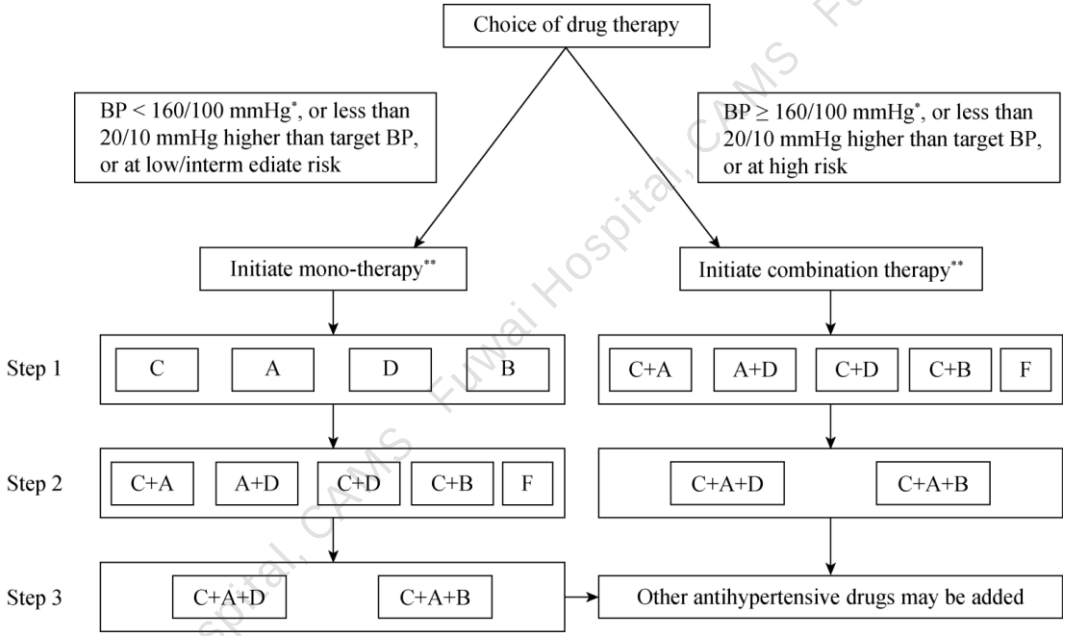
- **The way to achieve antihypertensive treatment target:** in addition to hypertensive emergencies and hypertensive urgencies, most hypertensive patients' BP should be gradually reduced to the target level within 4 weeks or 12 weeks according to their condition.

- **Timing of antihypertensive drug therapy:** on the basis of lifestyle improvement, patients with BP still ≥ 140/90 mmHg and/or above target BP should initiate drug therapy.

Combination therapy of antihypertensive drugs

- **Indications for combination therapy:** high-risk group of patients with BP ≥ 160/100 mmHg or 20/10 mmHg higher than that of the target BP often require two drugs for initial treatment. It is also feasible to initiate with small dose combination therapy if the patient's BP exceeds 140/90 mmHg. If the target BP is still not achieved, the dosage may be increased on the basis of the original medication, sometimes three or more than three drugs may be needed for antihypertension treatment.

- **Method of combination therapy:** when the two drugs are combined, their antihypertensive mechanism should be complementary; meanwhile, they should have an additive antihypertensive effect and can offset or alleviate the side effects of each other.



A: ACEI or ARB;
B: β-blockers;
C: dihydropyridines CCB;
D: thiazide-type diuretics;
F: fixed-dose combination drugs

Treatment of associated risk factors

Lipid treatment

- Actively treated with antihypertensive therapy and moderate lipid-lowering therapy based on changes in therapeutic lifestyle.
- In low and intermediate risk ASCVD, when the blood lipid level cannot reach the target value after strict implementation of lifestyle intervention for 6 months, drug lipid-lowering therapy should be considered.
- For patients with hypertension at risk of ASCVD, statin therapy should be initiated immediately. Moderate-strength statins (IA) can be used, if cholesterol-lowering drugs can be combined with when necessary.

Antiplatelet therapy

- Patients with hypertension associated with ischemic CVD

Treatment of associated risk factors

Blood glucose control

- Target of BG control: HbA1c < 7%; FBG 4.4–7.0 mmol/L; 2h postprandial BG or high peak BG< 10.0 mmol/L. Target of blood glucose control could be more relaxed for patients prone to hypoglycemia, with long course of disease, elder, with comorbidity or various complications.

Hypertension complicated with AF

- recommended to RAS inhibition drugs (especially ARB) to reduce the occurrence of atrial fibrillation
- patients with atrial fibrillation and risk factors for thromboembolism should be treated with anticoagulant therapy in accordance with the current guidelines

Treatment of associated risk factors

Management of hypertension with multiple risk factors

- Lifestyle intervention is the basis of cardiovascular disease prevention in hypertensive patients with multiple risk factors.

- It is suggested that hypertensive patients with elevated homocysteine level should be supplemented with fresh vegetables, fruits and folic acid, if necessary.

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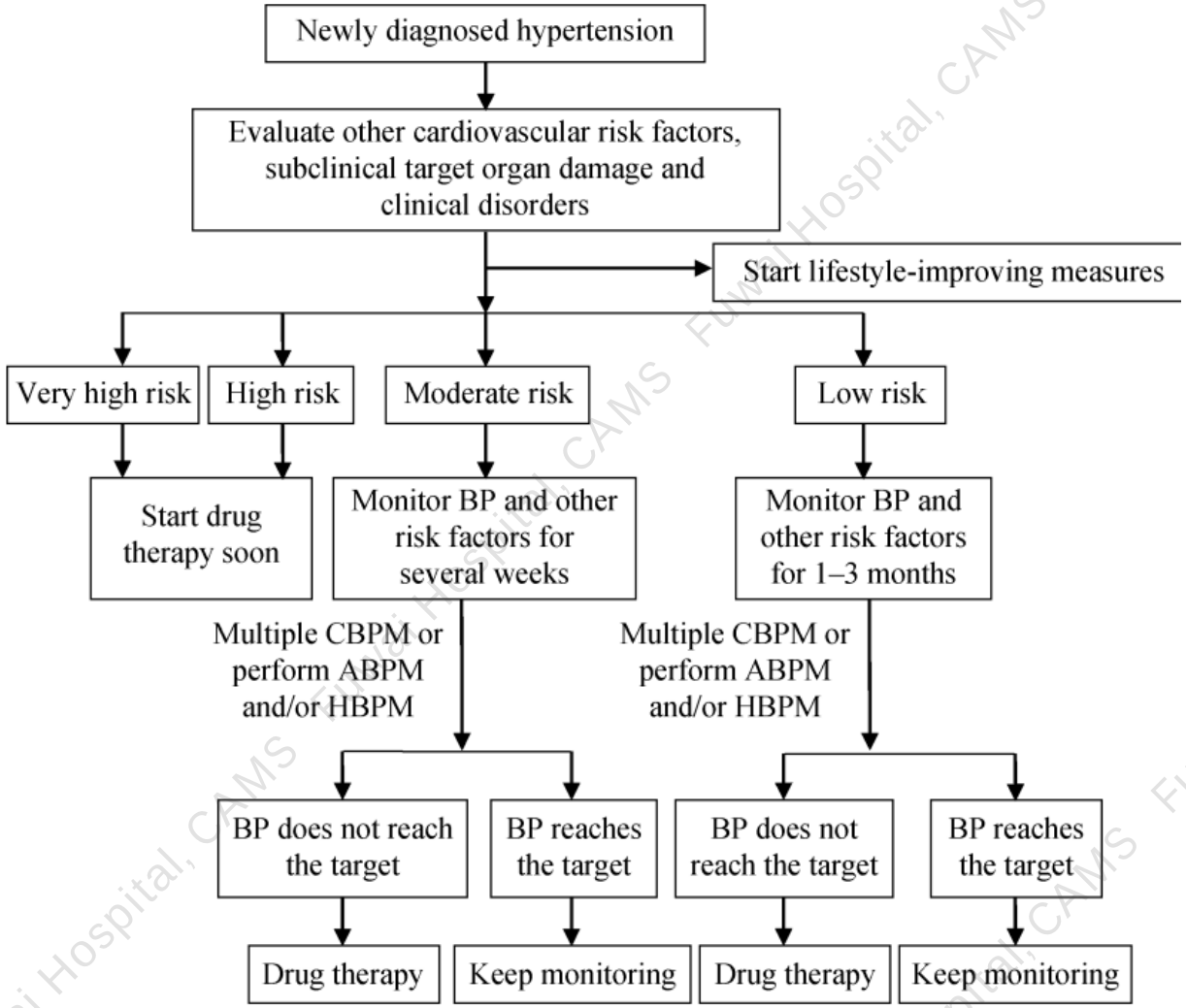

Evaluation and monitoring procedures for newly diagnosed hypertension.

Diagnostic criteria of hypertension for ABP is

daytime mean SBP ≥ 135 mmHg or DBP ≥ 85 mmHg,

nighttime mean SBP ≥ 120 mmHg or DBP ≥ 70 mmHg,

24-h mean SBP ≥ 130 mmHg or DBP ≥ 80 mmHg;

Criteria for home blood pressure is

mean SBP ≥ 135 mmHg or DBP ≥ 85 mmHg.

Moderate risk patients with BP ≥ 160/100 mmHg should start drug therapy immediately.

Thanks !