


***INTEGRATION OF THE WHO GUIDELINE FOR THE
PHARMACOLOGICAL TREATMENT OF
HYPERTENSION IN THE ADULT AND THE HEARTS
HYPERTENSION CLINICAL PATHWAY***



***DONALD J. DIPETTE MD FACP FAHA
DISTINGUISHED HEALTH SCIENCES PROFESSOR
UNIVERSITY OF SOUTH CAROLINA
UNIVERSITY OF SOUTH CAROLINA SCHOOL OF MEDICINE
COLUMBIA, SOUTH CAROLINA***

***CONTINUING MEDICAL EDUCATION PROGRAM
ST. LUCIA
MAY 15, 2023***

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: Scope and Objectives

(Almakki, DiPette, Whelton, et al. Hypertension 2022)

The guidelines address issues related to pharmacotherapy in adults with confirmed hypertension

1. BP threshold to start treatment

2. Whether lab tests or CVD risk assessment are needed first

3. Which drug(s) to prescribe and in which combinations

4. BP target for control of hypertension

5. Follow-up intervals

6. Use of nonphysician HCWs in the further management of hypertension

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: Strength of Recommendations

Guideline
for the
pharmacological
treatment of
hypertension
in adults



Strong Recommendation: Confident that desirable effects of adhering to the recommendation outweigh the undesirable effects

Conditional Recommendation/Weak Recommendation: the desirable effects of adhering to the recommendation probably outweigh the undesirable effects, but not confident of these trade-offs

Hypertension Clinical Pathway

HEARTS pillars and technical package

System for Monitoring and Evaluation

2021 WHO Hypertension Guidelines

Regulatory Framework on BPMDs

Hypertension Drivers and Scorecards

HEARTS App – CVD Risk Calculator

Maturity and Performance Indexes

Access to medicines through the Strategic Fund

A ACCURATE BLOOD PRESSURE MEASUREMENT

MEASURE BLOOD PRESSURE IN ALL ADULTS AND AT ALL VISITS

- 1 Don't have a conversation
- 2 Support arm at heart level
- 3 Put the cuff on bare arm
- 4 Use correct cuff size
- 5 Support feet
- 6 Keep legs uncrossed
- 7 Empty bladder first
- 8 Support back

Whenever available, use validated automatic devices for the arm.

B CARDIOVASCULAR RISK

KNOW YOUR RISK OF CARDIOVASCULAR DISEASE AND HOW TO MODIFY IT

CARDIOVASCULAR RISK CALCULATOR

Use the HEARTS App to assess your cardiovascular risk

Scan code to access the cardiovascular risk calculator

This App does not replace clinical judgment.

C TREATMENT PROTOCOL

START TREATMENT IMMEDIATELY AFTER CONFIRMING HYPERTENSION

Blood Pressure $\geq 140/90$ mmHg in all HYPERTENSIVES.
 Systolic Blood Pressure ≥ 130 mmHg in HIGH-RISK HYPERTENSIVES
 (Established cardiovascular disease, Diabetes, Chronic Kidney Disease, Risk score $\geq 10\%$)

Cardiovascular risk	All Hypertensives	HIGH-RISK Hypertensives	
		WITH established cardiovascular disease	WITHOUT established cardiovascular disease
Blood Pressure TARGET $<140/90$ mmHg	✓		
Systolic Blood Pressure TARGET <130 mmHg		✓	✓
ASPIRIN 100 mg/daily		✓	
High-dose statins: ATORVASTATIN 40 mg/daily		✓	
Moderate-dose statins: ATORVASTATIN 20 mg/daily			✓

Avoid alcohol consumption

Body mass index between 18.5 and 24.9

Avoid foods high in sodium

- 1 1 Tablet of Telmisartan/Amlodipine 40/5 mg 1 MONTH
- 2 Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10 mg 1 MONTH
- 3 Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10 mg + ½ Tablet of Chlorthalidone 25 mg 1 MONTH
- 4 Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10mg + 1 Tablet of Chlorthalidone 25 mg 1 MONTH

Patient above target:
Refer to the next level of care

Do 30 minutes of physical activity daily

Keep a healthy diet

No smoking

Patients under control	Minimum 6-MONTH follow-up	Minimum 3-MONTH follow-up	Supply medicines for 3 MONTHS	Vaccination		
				Influenza	Pneumococcus	COVID
All Hypertensives	✓		✓			✓
HIGH-RISK Hypertensives		✓	✓	✓	✓	✓

Country Name

Entity name

ASSESS TREATMENT ADHERENCE AT EACH VISIT

TAKE ALL MEDICATIONS AT THE SAME TIME EVERY DAY

This protocol is NOT INDICATED in WOMEN of CHILDBEARING AGE

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: R1. BP threshold for the initiation of pharmacologic treatment

WHO recommends initiation of pharmacological antihypertensive treatment of individuals with a confirmed diagnosis of hypertension and SBP of ≥ 140 mmHg or DBP of ≥ 90 mmHg. (Strong recommendation, moderate-high certainty evidence)

WHO recommends pharmacological antihypertensive treatment of individuals with existing cardiovascular disease and systolic blood pressure of 130-139 mmHg (Strong recommendation, moderate-high certainty evidence)

WHO suggests pharmacological treatment of individuals without cardiovascular disease but with high cardiovascular risk, diabetes mellitus, chronic kidney disease, and a SBP of 130-139 mmHg (Conditional recommendation, moderate-high certainty evidence)

Implementation remarks: Treatment should start no later than 4 weeks after diagnosis. If BP $\geq 160/90$ mmHg or end organ damage is present-start without delay

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: R6. Recommendation on target blood pressures

WHO recommends a target blood pressure treatment goal of <140/90 mmHg in all patients with hypertension without comorbidities (Strong recommendation, moderate-certainty evidence)

WHO recommends a target SBP treatment goal of <130 mmHg in all patients with hypertension and known cardiovascular disease (CVD) (Strong recommendation, moderate-certainty evidence)

WHO suggests a target SBP goal of <130 mmHg in high-risk patients with hypertension (those with high CVD risk, diabetes mellitus, and chronic kidney disease) (Conditional recommendation, moderate-certainty evidence)

MODULES OF THE HEARTS TECHNICAL PACKAGE				
Module	What does it include?	Who are the target users?		
		National	Subnational	Primary care
H healthy-lifestyle counselling	Information on the four behavioural risk factors for CVD is provided. Brief interventions are described as an approach to providing counselling on risk factors and encouraging people to have healthy lifestyles.		✓	✓
E evidence-based protocols	A collection of protocols to standardize a clinical approach to the management of hypertension and diabetes.	✓	✓	✓
A ccess to essential medicines and technology	Information on CVD medicine and technology procurement, quantification, distribution, management and handling of supplies at facility level.	✓	✓	✓
R isk-based CVD management	Information on a total risk approach to the assessment and management of CVD, including country-specific risk charts.		✓	✓
T eam-based care	Guidance and examples on team-based care and task shifting related to the care of CVD. Some training materials are also provided.		✓	✓
S ystems for monitoring	Information on how to monitor and report on the prevention and management of CVD. Contains standardized indicators and data-collection tools.	✓	✓	✓

Diagnosing Hypertension

- The diagnosis of hypertension should be confirmed at an additional patient visit, usually 1 to 4 weeks after the first measurement. In general, hypertension is diagnosed if, on two visits on different days:
 - **systolic blood pressure on both days is ≥ 140 mmHg and/or**
 - **diastolic blood pressure on both days is ≥ 90 mmHg**

C

TREATMENT PROTOCOL

START TREATMENT IMMEDIATELY AFTER CONFIRMING HYPERTENSION

Blood Pressure $\geq 140/90$ mmHg in **all HYPERTENSIVES**.

Systolic Blood Pressure ≥ 130 mmHg in **HIGH-RISK HYPERTENSIVES**
(Established cardiovascular disease, Diabetes, Chronic Kidney Disease, Risk score $\geq 10\%$)

Cardiovascular risk

	All Hypertensives	HIGH-RISK Hypertensives	
		WITH established cardiovascular disease	WITHOUT established cardiovascular disease
Blood Pressure TARGET $<140/90$ mmHg	✓		
Systolic Blood Pressure TARGET <130 mmHg		✓	✓
ASPIRIN 100 mg/daily		✓	
High-dose statins: ATORVASTATIN 40 mg/daily		✓	
Moderate-dose statins: ATORVASTATIN 20 mg/daily			✓

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: R2. Recommendation on laboratory testing before and during treatment

- **When starting pharmacological antihypertensive treatment, WHO suggests** obtaining tests to screen for comorbidities and secondary hypertension, but only when testing does not delay or impede starting treatment (Conditional recommendation, low-certainty evidence)
- **Implementation remarks:**
 - Suggest tests include serum electrolytes and creatinine, lipid panel, HbA1C or fasting glucose, urine dipstick, and electrocardiogram (ECG)
 - When testing may not be possible, treatment should not be delayed, and testing can be done subsequently
 - Long-acting dihydropyridine-calcium channel blockers are more suitable for initiation without testing compared to diuretics or ACE-I/ARB

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: R3. CVD risk assessment as a guide to initiation of antihypertensive medications

- **WHO suggests** cardiovascular risk assessment at or after the initiation of pharmacological treatment for hypertension, but only where this is feasible and does not delay treatment (Conditional recommendation, low-certainty evidence)
- **Implementation remarks:**
 - Most patients with BP \geq 140/90 mmHg are high risk and treatment is indicated; they do not need CVD risk assessment prior to initiating treatment. Assessment is more important for guiding treatment decisions in those with SBP 130-139 mmHg and to identify other risk factors so that they can be treated appropriately as well
 - Risk assessment should be postponed and included in the follow-up strategy if it interferes with timely treatment

MODULES OF THE HEARTS TECHNICAL PACKAGE				
Module	What does it include?	Who are the target users?		
		National	Subnational	Primary care
H healthy-lifestyle counselling	Information on the four behavioural risk factors for CVD is provided. Brief interventions are described as an approach to providing counselling on risk factors and encouraging people to have healthy lifestyles.		✓	✓
E vidence-based protocols	A collection of protocols to standardize a clinical approach to the management of hypertension and diabetes.	✓	✓	✓
A ccess to essential medicines and technology	Information on CVD medicine and technology procurement, quantification, distribution, management and handling of supplies at facility level.	✓	✓	✓
R isk-based CVD management	Information on a total risk approach to the assessment and management of CVD, including country-specific risk charts.	✓	✓	✓
T eam-based care	Guidance and examples on team-based care and task shifting related to the care of CVD. Some training materials are also provided.		✓	✓
S ystems for monitoring	Information on how to monitor and report on the prevention and management of CVD. Contains standardized indicators and data-collection tools.	✓	✓	✓

Hypertension Clinical Pathway

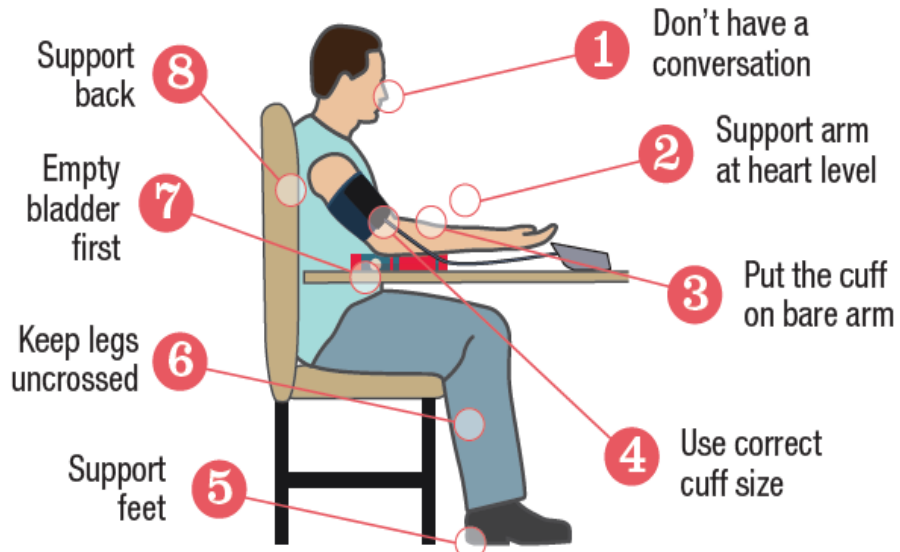
A

ACCURATE BLOOD PRESSURE MEASUREMENT

MEASURE BLOOD PRESSURE IN ALL ADULTS AND AT ALL VISITS



Whenever available, use validated automatic devices for the arm.



B

CARDIOVASCULAR RISK

KNOW YOUR RISK OF CARDIOVASCULAR DISEASE AND HOW TO MODIFY IT

CARDIOVASCULAR RISK CALCULATOR

Use the **HEARTS** App to assess your cardiovascular risk



Scan code to access the cardiovascular risk calculator



This App does not replace clinical judgment.

C

TREATMENT PROTOCOL

START TREATMENT IMMEDIATELY AFTER CONFIRMING HYPERTENSION

Blood Pressure $\geq 140/90$ mmHg in **all HYPERTENSIVES**.

Systolic Blood Pressure ≥ 130 mmHg in **HIGH-RISK HYPERTENSIVES**
(Established cardiovascular disease, Diabetes, Chronic Kidney Disease, Risk score $\geq 10\%$)

Cardiovascular risk

	All Hypertensives	HIGH-RISK Hypertensives	
		WITH established cardiovascular disease	WITHOUT established cardiovascular disease
Blood Pressure TARGET $<140/90$ mmHg	✓		
Systolic Blood Pressure TARGET <130 mmHg		✓	✓
ASPIRIN 100 mg/daily		✓	
High-dose statins: ATORVASTATIN 40 mg/daily		✓	
Moderate-dose statins: ATORVASTATIN 20 mg/daily			✓

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: R4. Recommendation of drug classes to be used as first-line agents

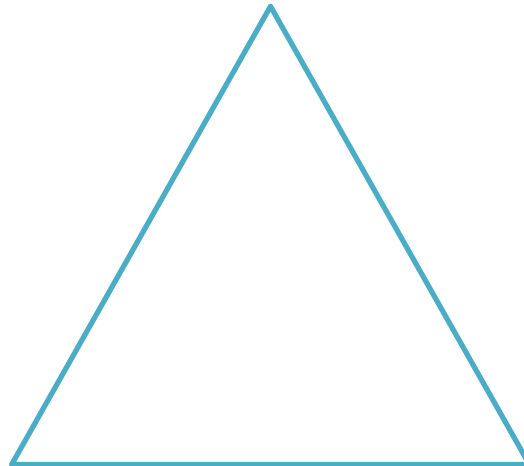
- For adults with hypertension requiring pharmacological treatment, WHO recommends the use of drugs from any of the following three classes of medications as an initial treatment: (Strong recommendation, high-certainty evidence)
 1. Thiazide and thiazide-like agents
 2. Angiotensin converting-enzyme inhibitors (ACE-I)/angiotensin receptor blockers (ARBs)
 3. Long-acting dihydropyridine calcium channel blockers (CCBs) (Strong Recommendation)
- **Implementation remarks:**
 - Long-acting antihypertensives are preferred
 - Other specific agents may be included for other concomitant diseases or co-morbidities (beta-blockers for heart failure, ischemic heart disease, for example)

Initial Classes of Medications for the Management of Hypertension

β -blockers should be included in the regimen if there is a compelling indication for a β -blocker

ACE inhibitors
or
ARBs

Diuretics



Calcium
antagonists

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: R5. Recommendation of combination therapy

- **For adults with hypertension requiring pharmacological treatment, WHO suggests combination therapy**, preferably with a single-pill combination, as initial treatment. Antihypertensive medications used in combination therapy should be chosen from the following three classes **(Conditional recommendation, moderate-certainty evidence)**
 1. Thiazide and thiazide-like agents
 2. Angiotensin converting-enzyme inhibitors (ACEis)/angiotensin receptor blockers (ARBs)
 3. Long-acting dihydropyridine calcium channel blockers (CCBs)
- **Implementation remarks:**
 - Combination therapy may be especially valuable when baseline BP is $\geq 20/10$ mmHg higher than the target blood pressure
 - Single-pill combination therapy improves medication adherence, persistence, and BP control

Hypertension treatment algorithm: Key for a population-public health approach

- Critical strategy to increase hypertension control rates
- Addresses clinical/therapeutic inertia
- Simple, straightforward, and standardized
- Adopted: local/system, state, and/or country-wide

Guiding principles:

Primary care based

Algorithm is for the “rule” NOT the “exception”

Few medication titration steps: linear with no branch points

Half-maximal effective dose of selected agent(s) for initial treatment

Two medications (two pills or in FDC/SPC) for initial treatment

- Most eventually need multiple drugs
- Greater efficacy (additive or synergistic)-improves blood pressure control rates
- Allows lower dosages of each of the 2 drugs
 - More effective than a higher dose of either single drug
 - Reduced side effects
- Simplified treatment regimen: better adherence
- Reduces clinical inertia
- When complementary drug classes are chosen, lowers BP equally across diverse demographic groups
- Economic benefits
 - Lower health care costs and fewer office visits

Which Classes of Two-Medication Combinations?

(DiPette et al. JCH 2019)

- Renin angiotensin aldosterone system (RAAS) inhibitor-Calcium channel blocker (CCB): **Preferred** in the following order:
 1. Angiotensin-Receptor Blocker (ARB)-CCB
 2. Angiotensin-Converting Enzyme inhibitor (ACEI)-CCB
 3. ARB-Thiazide or Thiazide-like diuretic (DIU)
 4. ACEI-DIU
- CCB-DIU and all others **Not-Preferred** unless other indications

Building the Ideal Fixed Dose Combinations

(DiPette et al. J Clinical Hypertension 2018)

ARB + CCB	
Azilsartan OR Telmisartan OR Irbesartan	Amlodipine
ACE-I + CCB	
Lisinopril OR Ramipril OR Benazepril	Amlodipine
ARB + Thiazide/Thiazide Like Diuretic	
Azilsartan OR Telmisartan OR Irbesartan	Chlorthalidone OR Hydrochlorothiazide
ACE- I + Thiazide/Thiazide Like Diuretic	
Lisinopril OR Benazepril	Chlorthalidone OR Hydrochlorothiazide



Avoid alcohol consumption



Body mass index between 18.5 and 24.9



Avoid foods high in sodium

1

1/2 Tablet of Telmisartan/Amlodipine 80/10 mg

1 MONTH



Do 30 minutes of physical activity daily

2

**Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10 mg**

1 MONTH



Keep a healthy diet

3

**Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10 mg
+ 1/2 Tablet of Chlorthalidone 25 mg**

1 MONTH

4

**Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10mg
+ 1 Tablet of Chlorthalidone 25 mg**

1 MONTH



No smoking

**Patient above target:
Refer to the next level of care**

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: R7. Recommendation on frequency of assessment

WHO suggests a monthly follow up after the initiation or change in antihypertensive medications until patients reach target (Conditional recommendation, low certainty evidence)

WHO suggests a follow up every 3-6 months for patients whose blood pressure is under control (Conditional recommendation, low-certainty evidence)



Avoid alcohol consumption



Body mass index between 18.5 and 24.9



Avoid foods high in sodium

1

1/2 Tablet of Telmisartan/Amlodipine 80/10 mg

1 MONTH



Do 30 minutes of physical activity daily

2

Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10 mg

1 MONTH



Keep a healthy diet

3

Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10 mg
+ 1/2 Tablet of Chlorthalidone 25 mg

1 MONTH

4

Patient above target after repeat measurement
1 Tablet of Telmisartan/Amlodipine 80/10mg
+ 1 Tablet of Chlorthalidone 25 mg

1 MONTH



No smoking

Patient above target:
Refer to the next level of care

Patients under control	Minimum 6-MONTH follow-up	Minimum 3-MONTH follow-up	Supply medicines for 3 MONTHS	Vaccination		
				Influenza	Pneumococcus	COVID
All Hypertensives	✓		✓			✓
HIGH-RISK Hypertensives		✓	✓	✓	✓	✓



Country name
Entity name



ASSESS TREATMENT ADHERENCE AT EACH VISIT

TAKE ALL MEDICATIONS AT THE SAME TIME EVERY DAY

This protocol is **NOT INDICATED** in **WOMEN** of **CHILDBEARING AGE**

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: R8. Recommendation on treatment by nonphysician professionals

- **WHO suggests that pharmacological treatment of hypertension can be provided by nonphysician professionals** such as pharmacists and nurses, as long as, the following conditions are met: proper training, prescribing authority, specific management protocols, and physician oversight (**Conditional recommendation, low-certainty evidence**)
- **Implementation remarks:**
 - Community health workers may assist in tasks through a collaborative care model. The scope of care depends on local regulations
 - Telemonitoring and community or home-based self-care are encouraged
 - Physician oversight can be done through innovative methods such as telemonitoring or similar, to ensure access to treatment is not delayed

MODULES OF THE HEARTS TECHNICAL PACKAGE				
Module	What does it include?	Who are the target users?		
		National	Subnational	Primary care
H healthy-lifestyle counselling	Information on the four behavioural risk factors for CVD is provided. Brief interventions are described as an approach to providing counselling on risk factors and encouraging people to have healthy lifestyles.		✓	✓
E vidence-based protocols	A collection of protocols to standardize a clinical approach to the management of hypertension and diabetes.	✓	✓	✓
A ccess to essential medicines and technology	Information on CVD medicine and technology procurement, quantification, distribution, management and handling of supplies at facility level.	✓	✓	✓
R isk-based CVD management	Information on a total risk approach to the assessment and management of CVD, including country-specific risk charts.		✓	✓
T eam-based care	Guidance and examples on team-based care and task shifting related to the care of CVD. Some training materials are also provided.		✓	✓
S ystems for monitoring	Information on how to monitor and report on the prevention and management of CVD. Contains standardized indicators and data-collection tools.	✓	✓	✓

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults: Additional Pertinent Content

- **Provides protocol development pathways and example protocols including specific medications and dosages for the initial pharmacological treatment with one medication and more pertinent for combination (two-medications) therapy**
- **Provides information regarding hypertension in special settings as follows:**
 - Hypertension in disaster, humanitarian, and emergency settings
 - COVID-19 and hypertension
 - Pregnancy and hypertension

Patients under control	Minimum 6-MONTH follow-up	Minimum 3-MONTH follow-up	Supply medicines for 3 MONTHS	Vaccination		
				Influenza	Pneumococcus	COVID
All Hypertensives	✓		✓			✓
HIGH-RISK Hypertensives		✓	✓	✓	✓	✓

Country name
Entity name



ASSESS TREATMENT ADHERENCE AT EACH VISIT

TAKE ALL MEDICATIONS AT THE SAME TIME EVERY DAY

This protocol is
NOT INDICATED
in **WOMEN** of
CHILDBEARING
AGE

WHO Guideline for the Pharmacological Treatment of Hypertension in Adults and HEARTS Hypertension Clinical Pathway: Closing Thoughts

BOTH “START WITH THE END IN MIND”: INCREASING HYPERTENSION CONTROL

- Lower and lower blood pressure pharmacological blood pressure treatment thresholds and targets
- Increasing use of cardiovascular risk in blood pressure treatment decisions (thresholds and targets)
- Importance of the use of standardized, straightforward, and simple treatment algorithms/protocols
- Strong consideration for the use of two medications (two-pills or better yet single-pill, fixed dose combination) in the initial treatment in newly diagnosed hypertension
- Importance of timely patient follow-up, rapid titration, and vaccinations



Thank You