

# **MASKED HYPERTENSION**

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# Masked Hypertension

## IT IS A MEASUREMENT PHENOMENON

Masked hypertension (MH) should be restricted to untreated patients with a clinic normal BP, associated with an abnormally high self-measured BP ( $\geq 135/85$  mmHg) or ABPM ( $\geq 130$ – $135/85$  mmHg for daytime BP).

Masked uncontrolled hypertension (MUCH) refers to treated hypertension in presence of residual masked hypertension .

# The combination of out-of-office blood pressure measurements with office blood pressure measurements

<b>Blood pressure status</b>	<b>Office BP</b>	<b>Out-of-office BP</b>
<b>Normotension</b>	<b>Normal</b>	<b>Normal</b>
<b>White coat hypertension</b>	<b>High</b>	<b>Normal</b>
<b>Masked hypertension</b>	<b>Normal</b>	<b>High</b>
<b>Sustained hypertension</b>	<b>High</b>	<b>High</b>

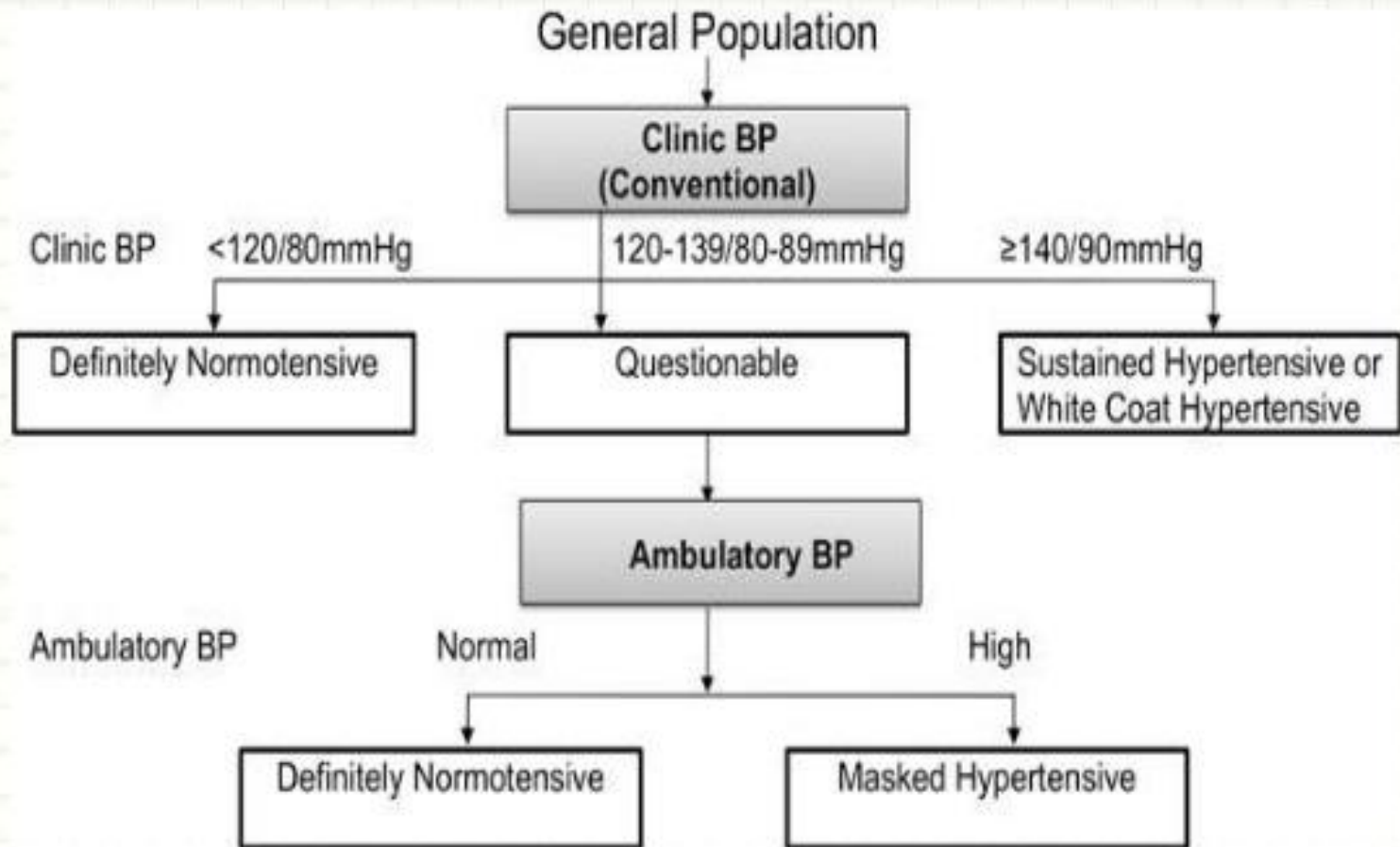
**It may occur in as many as 10% of the general population, and is important because it is not diagnosed by routine medical examinations, but carries an adverse prognosis, both in terms of increased target organ damage and cardiovascular events.**



## **PREVALENCE**

**About 1 in 7 or 8 persons with a normal office BP level may have masked hypertension.**

# Screening



**What are the categories of patients among whom masked hypertension is Likely?**

- 1-Elderly patients with increased BP variability.**
- 2-Patients with mental stress at work or at home .**
- 3-Smokers and patients who consume excessive alcohol**
- 4-Patients with sedentary life and obesity .**
- 5-Patients with metabolic syndrome, diabetes mellitus, chronic kidney disease, shortened sleep time, or obstructive sleep apnea .**
- 6-Patients with high normal office BP levels.**
- 7-Patients at high cardiovascular risk.**

## **Diagnostic Strategies for Masked Hypertension**

- Office monitoring of BP cannot provide a profile of BP over 24 hours as with ABPM or track BP for multiple days, weeks, and months as with HBPM.
- **Neither office nor HBPM had sufficient sensitivity nor specificity to replace ABPM as the reference standard.**
- **A further advantage of ABPM over HBPM is the ability to identify patients with normal daytime but nocturnal masked hypertension.**
- **Many of ABPM readings are taken during normal daily activity, whereas HBPM readings are always taken at rest.**
- It has been recommended that a positive diagnosis of MH be confirmed by ABPM before commencing antihypertensive therapy.

# Ambulatory & Homeblood Pressure Values (mm.Hg)

	Interval	Optimal Bp,	Normal Bp.	Abnormally high
ABPM	Daytime	<130\80	<135\85	More than or equal to 135\85
Home	Daytime	< 130\80	<135\85	More than or equal to 135\85
ABPM	Night time	<115\65	<120\70	More than or equal to 125\75
ABPM	24 hours	<125\75	<130\80	More than or equal to 135\85



- **Elevated nighttime BP and rising nocturnal BP patterns, with or without elevated daytime ABPM values, may be associated with normal conventional office BP values, and hence with a diagnosis of masked hypertension.**
- **So there is a need for 24-hour ABPM with assessment of both day and nighttime BP to diagnose masked hypertension in the many conditions where it might occur.**

## **Why is it important to detect MH and MUHP?**

- **Both MH and MUCH are risk factors for CVS disease.**
- **Delay in making the diagnosis of MH may account for the high prevalence of hypertensive CVS target organ damage.**

## **Is masked hypertension a risk factor for sustained HP?**

- **It is debated whether patients with white-coat and masked hypertension are at greater risk of developing a sustained hypertensive state .**

## **Antihypertensive treatment increase the prevalence of MUCH & so increases its cardiovascular risk, as compared to the:**

- **1- untreated masked hypertensives**
- **2-treated normotensive**
- **3-untreated sustained normotensive**

## **How does treatment affect the prevalence of MUCH?**

- **The high prevalence of MUCH among treated subjects suggests suboptimal antihypertensive treatment, largely because focusing primarily on normalizing conventional office BP values.**
- **In contrast, optimal treatment that uses out-of-office BP monitoring will decrease MUCH by maximal conversion to sustained normotension**

# Prevalence of cardiovascular events in patients with masked hypertension

Bp status	No.of participants	CV Event No.	Percent
Normotension	2441	63	2.6%
Prehypertension	2776	129	4.6%
Normotension+MH	198	14	7.1%
Prehypertension+MH	900	90	10.0%

Category	SBP.mmHg	DBP. mmHg
Normal	< 120	< 80
Prehypertension	120-139	or 80-89

## Stroke events among patients with masked hypertension

Bp status	No. of participants	Stroke event No.	Percent	
Normotension	2441	13	0.5%	
Prehypertension	2776	45	1.6%	
Normotension+MH	198	5	2.5%	
Prehypertension+MH	900	31	3.4%	

**In chronic kidney disease (CKD), nearly 60% of treated patients have MUCH, in prevalence of :**

- 66% of patients with high-normal clinic BP.
- 33% of patients with normal clinic BP.
- 17% of patients with optimal clinic BP.
- So, patients with CKD warrant ABPM screening for MUCH.

## **Treatment Strategies for Masked Hypertension**

- As patients with MH ,have increased risk of cardiovascular and renal morbidity with an overall cardiovascular risk approaching that of sustained hypertensives,so treatment should be considered.**

**However, additional questions remain unanswered:**

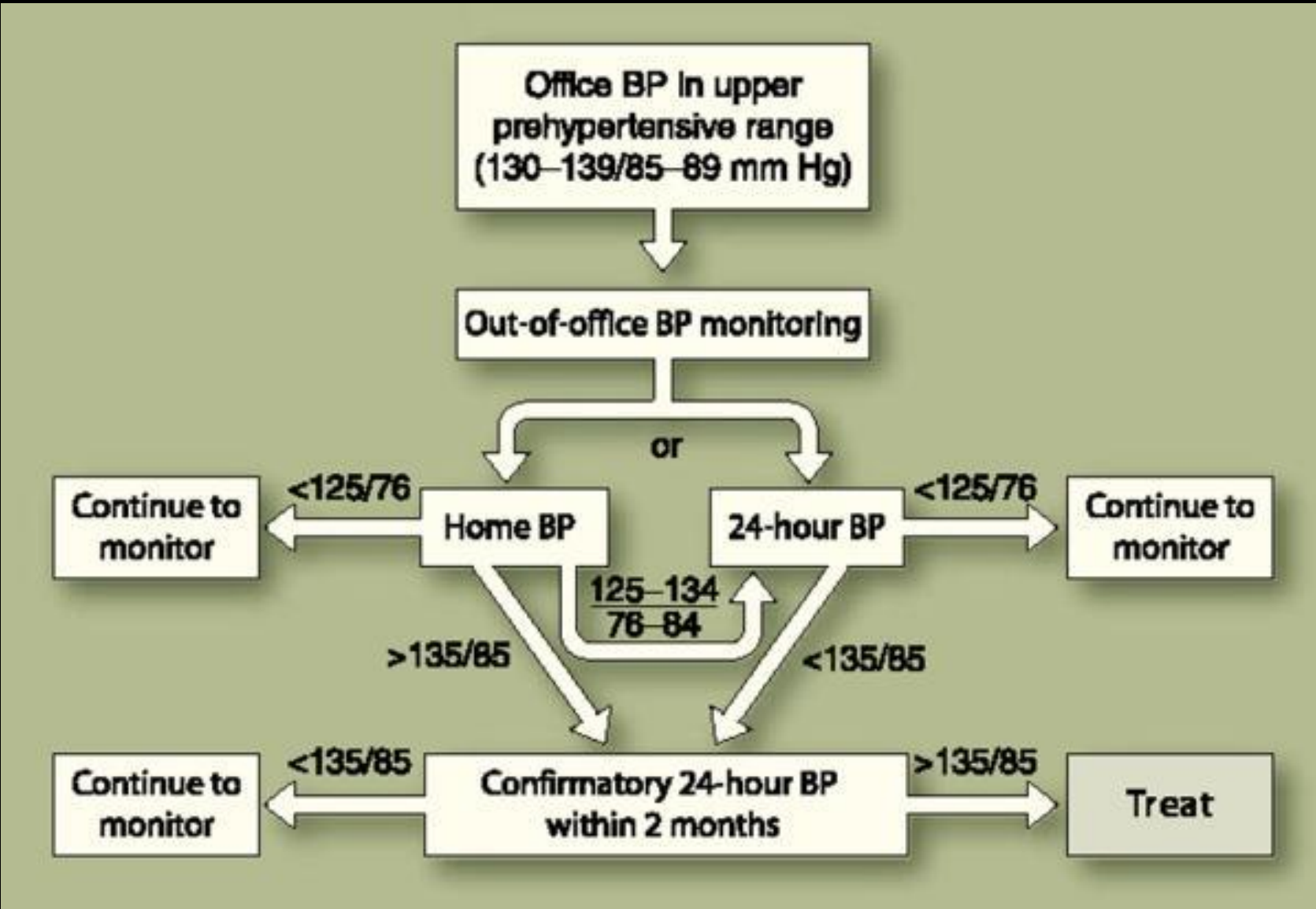
- 1) Because in-office BPs are already well within normal in patients with masked hypertension, is there a limit to further reduction in-office BP that would decrease a cardiovascular risk?**
- 2) Will the benefit of active drug treatment in reducing hypertensive target organ damage and cardiovascular events be similar in patients with masked hypertension as in those with sustained hypertension?**

## Role of physicians in the prevention and management of masked hypertension

- Ensuring optimal' antihypertensive treatment.
- Selecting long-acting antihypertensive medications.
- ABPM and/or HBPM.
- Out-of-office BP monitoring, has the best chance of achieving sustained normotension without over treatment.



# Algorithm for evaluating and treating masked hypertension.

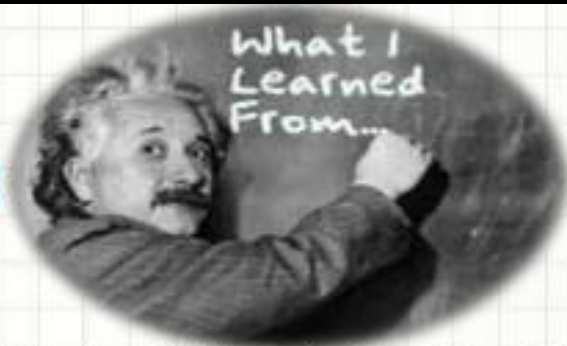


If patients are found to have masked hypertension (>135/85 mm Hg by either HBPM or ABPM), the 24-h ABPM should be repeated within 2 months, to confirm the diagnosis.

Those patients whose HBPM reading lies in the range of 125–135/76–84 mm Hg should undergo confirmatory ABPM, because the rate of masked hypertension is much higher in patients whose blood pressure is in the high range.

Once masked hypertension is confirmed, patients should undergo comprehensive cardiovascular risk assessment (including ECG, fasting lipid profile, fasting glucose, basic metabolic profile, and urinalysis), and they should be treated with antihypertensive medications, similar to patients with sustained hypertension.

# TAKE HOME MESSAGES



- The prevalence of masked hypertension in patients with treated and well-controlled clinic BP is high.
- MH is more common in patients with CKD and associated with lower eGFR, proteinuria, and cardiovascular target organ damage.
- Nocturnal BP is increasingly recognized as a strong predictor of risk in many studies of ABPM.
- Clinic BP monitoring alone is not adequate to optimize BP control because many patients have an elevated nocturnal BP.
- The US Preventive Services Task Force concluded that ABPM is the diagnostic method of choice for detecting both outliers of white coat and masked hypertension.

THANK YOU