Section I. Accurate Measurement of Blood Pressure

2015 **C**anadian **H**ypertension
Education **P**rogram
Recommendations

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I. Accurate Measure of Blood Pressure
Assess blood pressure at all appropriate visits

When should blood pressure be measured?

- Health care professionals should know the blood pressure of all of their patients/clients.
- Blood pressure of all adults should be measured whenever it is appropriate using standardized techniques.
  - To screen for hypertension
  - To assess cardiovascular risk
  - To monitor antihypertensive treatment

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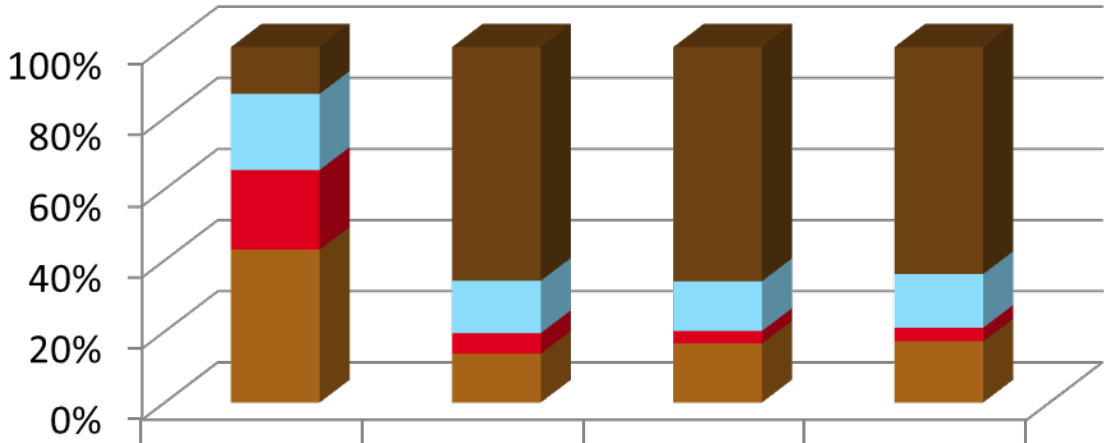
Hypertension Awareness, Treatment and Control



	Canada (1986-1992)	Ontario (2006)	Canada (2007-2009)	Canada (2009-2011)
Treated and controlled	13.2%	65.7%	65.9%	63.9%
Treated but not controlled	21.4%	14.7%	14.0%	15.1%
Aware but not treated	22.4%	5.8%	3.5%	3.8%
Unaware	43.0%	13.7%	16.6%	17.2%

Joffres MR, Hamet P, MacLean DR, L'italien GJ, Fodor G. Distribution of blood pressure and hypertension in Canada and the United States. Am J Hypertens. 2001;14(11):1099-1105.
Leenen FHH, Dumais J, McInnis NH, Turton P, Stratychuk L, Nemeth K, Lum-Kwong MM, Fodor G. Results of the Ontario Survey on the Prevalence and Control of Hypertension. *CMAJ.* 2008;178(11):1441-1449.
Wilkins K, Campbell NRC, Joffres MR, McAlister FA, Nichol M, Quach S, Johansen HL, Tremblay MS. Blood pressure in Canadian adults. *Health Reports*. 2010;21(1):37-46.
Statistics Canada. Blood pressure of Canadian adults, 2009 to 2011. Ottawa, ON: Statistics Canada, 2012. http://www.statcan.gc.ca/pub/82-625-x/2012001/article/11714-eng.pdf.

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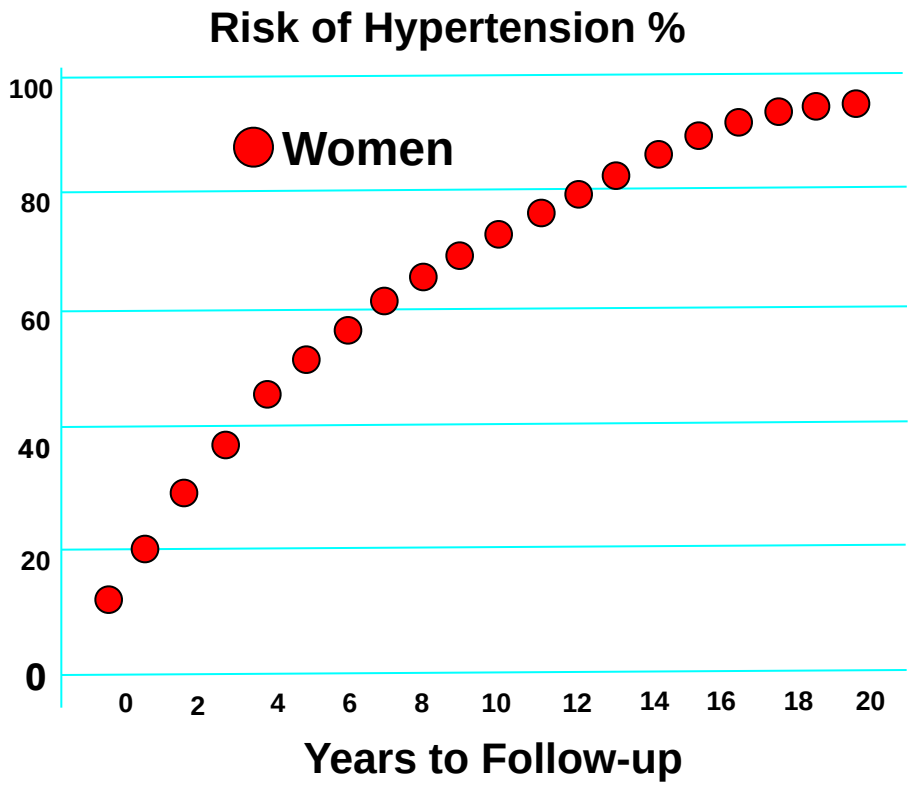
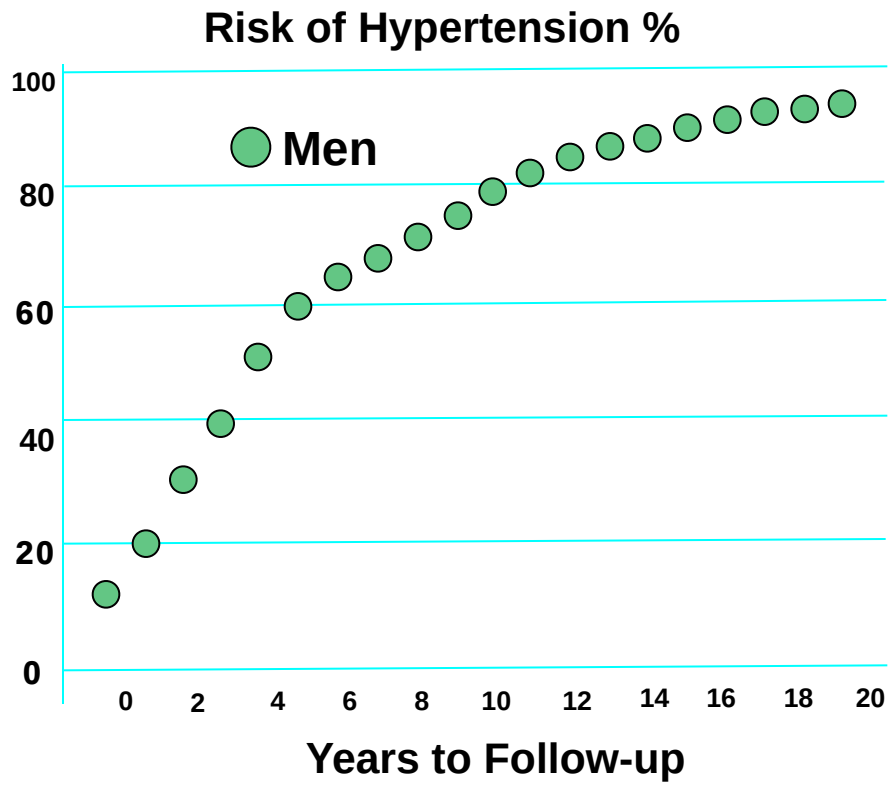
Lifetime Risk of Hypertension in Normotensive Women and Men Aged 65 Years





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Vasan R. *JAMA* 2002;287:1003-10.

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Reversible Risk Factors for Developing Hypertension

- Obesity
- Poor dietary habits
- High sodium intake
- Sedentary lifestyle
- High alcohol consumption

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Incidence of Hypertension in Those with High Normal Blood Pressure: TROPHY Study

- 772 subjects, mean age 48.5, mean BMI 30 kg/m^2
- Control arm (not receiving treatment for hypertension)
- Average of 3 blood pressures at baseline:
  - SBP 130-139 and DBP < 89 OR
  - SBP < 139 and DBP 85-89
- Primary endpoint was new onset hypertension.

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Julius S. *NEJM* 2006;354:1685-97.

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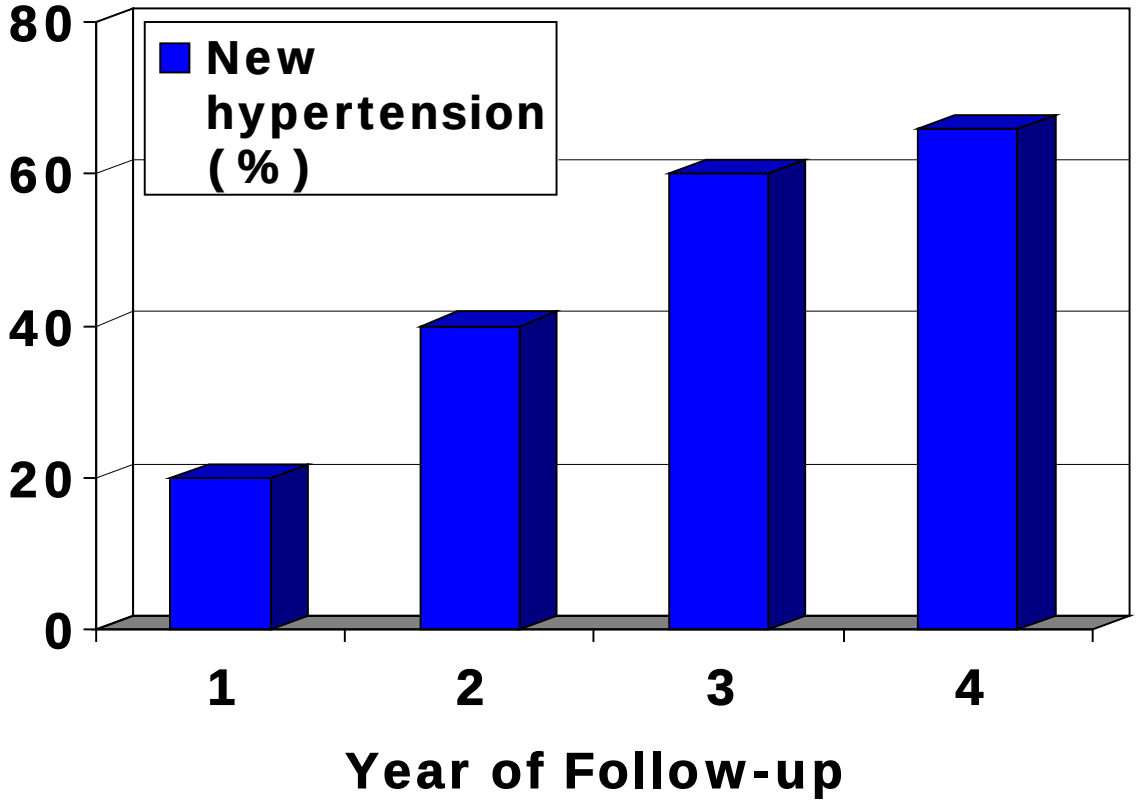
New-Onset Hypertension in People with High Normal Blood Pressure



Julius S. *NEJM* 2006;354:1685-97.

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High Risk of Developing Hypertension in Those with High Normal Blood Pressure

- Individuals with high-normal blood pressure are at high risk of progression to overt hypertension.

- Annual follow-up of patients with high normal blood pressure is recommended.

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I. BP measurement methods

- Office (attended, OBPM)
  - Oscillometric (electronic) – **preferred method**
  - Auscultatory (mercury, aneroid)
- Office Automated (unattended, AOBP)
  - Oscillometric (electronic)
- Ambulatory blood pressure monitoring (ABPM)
- Home blood pressure monitoring (HBPM)

For information on blood pressure measurement devices:

- http://www.dableducational.org/sphygmomanometers.html
- http://www.bhsoc.org/bp-monitors/bp-monitors/

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New 2015 Recommendation: BP Measurement

Office BP measurement (OBPM):

- Measurement using electronic (oscillometric) upper arm devices is preferred to auscultatory devices (Grade C).

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BP measurement methods

Office (attended, OBPM)

Auscultatory (mercury, aneroid)

Oscillometric (electronic)

http://www.dableducational.org/sphygmomanometers.html

http://www.bhsoc.org/bp-monitors/bp-monitors/

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BP measurement methods

Office (attended, OBPM)

Oscillometric (electronic) *Auscultatory (mercury, aneroid)*

Preferred

http://www.dableducational.org/sphygmomanometers.html

http://www.bhsoc.org/bp-monitors/bp-monitors/

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BP measurement methods

Office Automated (unattended, AOBP)

Oscillometric (electronic)

http://www.dableducational.org/sphygmomanometers.html

http://www.bhsoc.org/bp-monitors/bp-monitors/

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Automated Office Blood Pressure Measurement (AOBP)

- Automated office blood pressure measurements can be used in the assessment of office blood pressure*.

- When used under proper conditions, automated office SBP of 135 mmHg or higher or DBP values of 85 mmHg or higher should be considered analogous to mean awake ambulatory SBP of 135 mmHg or higher or DBP of 85 mmHg or higher*.

*see notes

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Use of Standardized Measurement Techniques is Recommended when Assessing Blood Pressure

- When using automated office oscillometric devices such as the BpTRU, the patient should be seated in a quiet room alone.
- With the device set to take measures at 1 minute intervals, an initial measurement is taken by a health professional to verify that the device is registering a measurement.
- The patient is left alone after the first measurement and the device automatically takes subsequent readings.

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Auscultatory OBPM is inaccurate

- In the real world, the accuracy of auscultatory OBPM can be adversely affected by provider, patient and device factors such as:
  - too rapid deflation of the cuff
  - digit preference with rounding off of readings to 0 or 5
  - also, mercury sphygmomanometers are being phased out and aneroid devices are less likely to remain calibrated

- Consequence: Routine auscultatory OBPMs are 9/6 mm Hg higher than standardized research BPs (primarily using oscillometric devices)

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Myers MG, et al. *Can Fam Physician* 2014;60:127-32.

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Keys to accurate OBPM

- Use standardized measurement techniques and validated equipment
- Measurement using electronic (oscillometric) upper arm devices is preferred over auscultation
- The first reading should be discarded and the latter two averaged.

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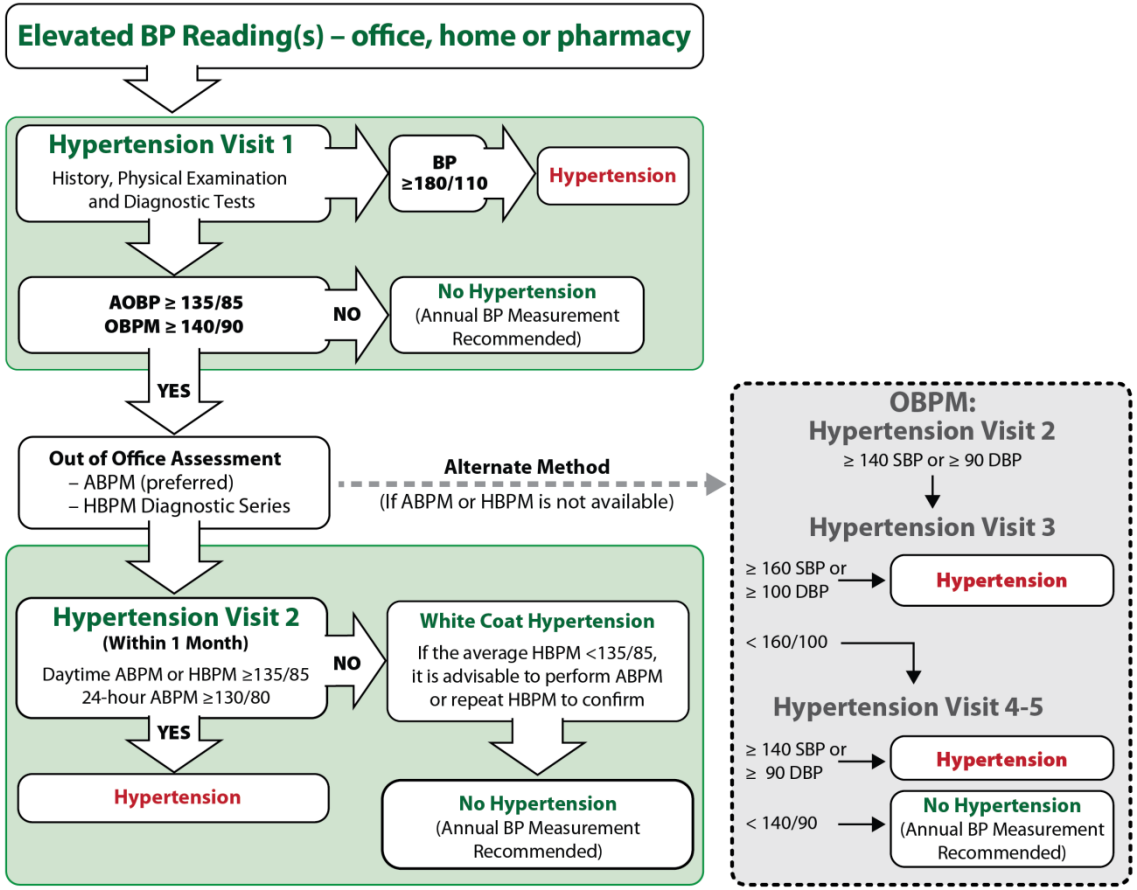
II. Criteria for the diagnosis of hypertension and recommendations for follow-up: overview



Measurement using electronic (oscillometric) upper arm devices is preferred over auscultation

ABPM: Ambulatory Blood Pressure Measurement
AOBP: Automated Office Blood Pressure
HBPM: Home Blood Pressure measurement
OBPM: Office Blood Pressure measurement

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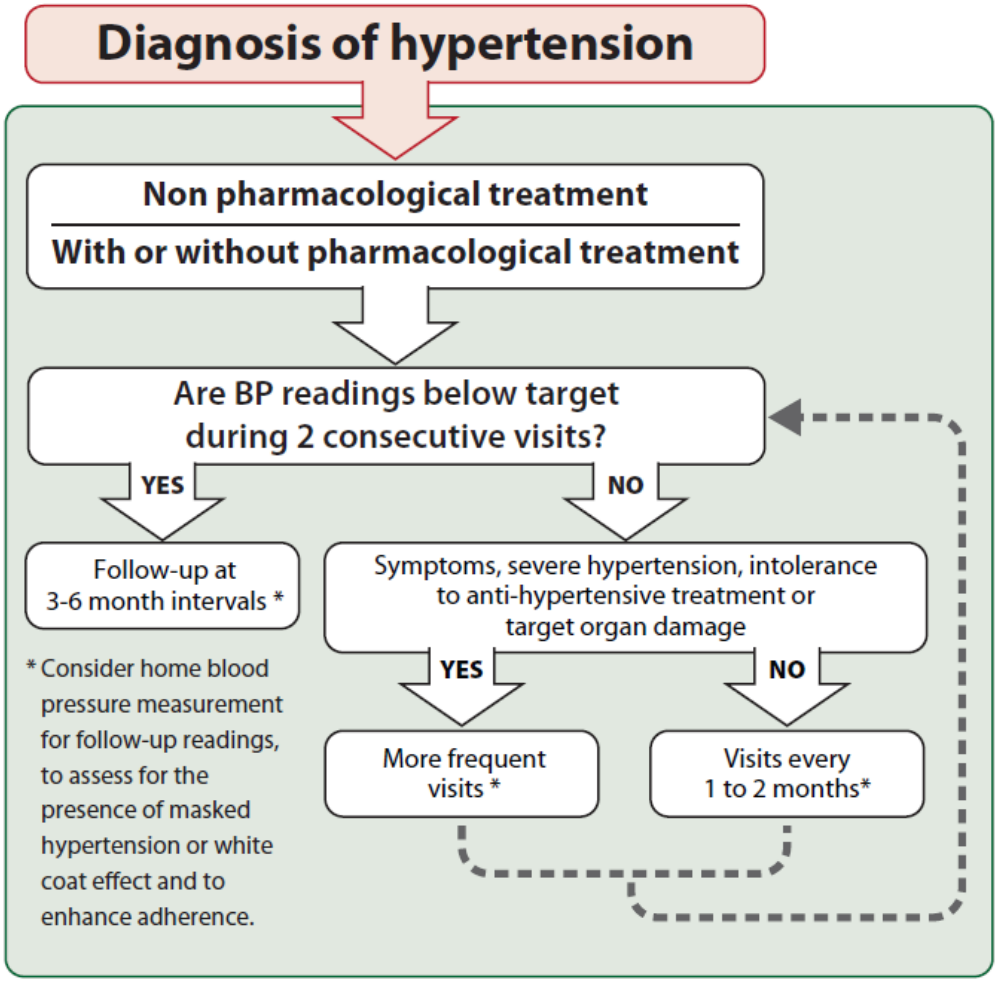
II. Criteria for the Diagnosis of Hypertension and Recommendations for Follow-up



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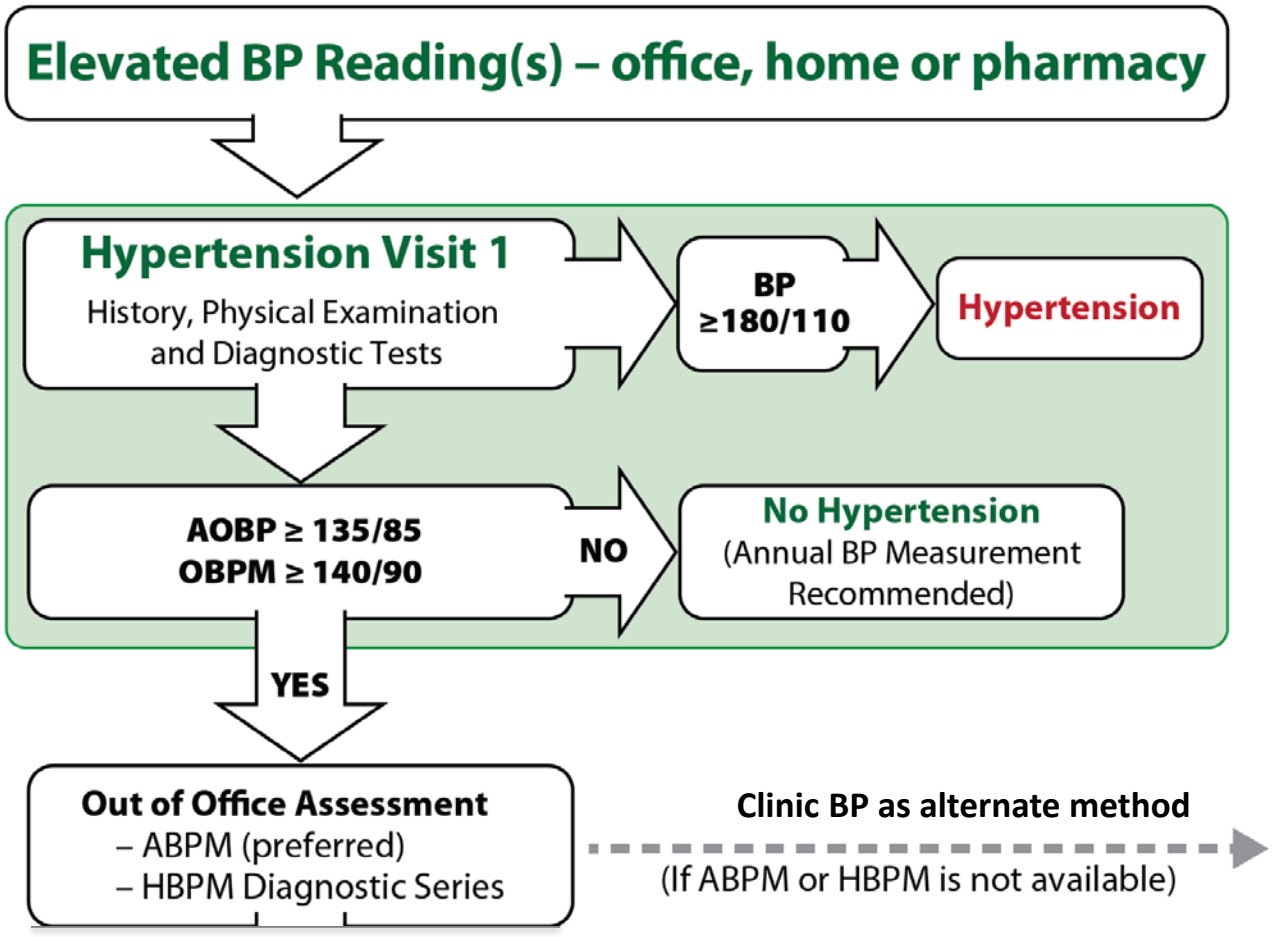
Out of office assessment is the preferred means of diagnosing hypertension



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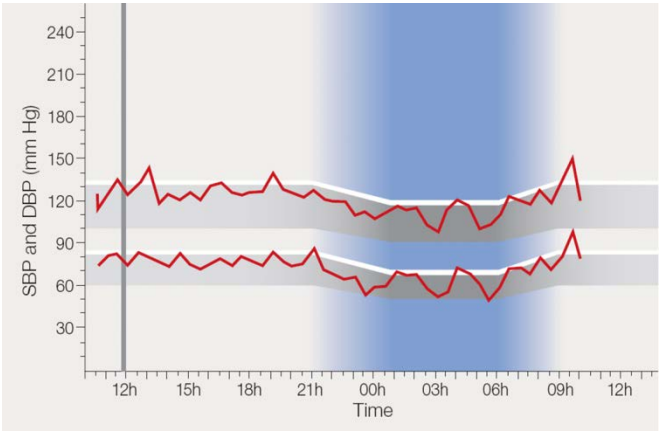
Out of office BP measurement methods: Ambulatory (ABPM)



http://www.dableducational.org/sphygmomanometers.html
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Out of office BP measurement methods: Home (HBPM)

http://www.dableducational.org/sphygmomanometers.html

http://www.bhsoc.org/bp-monitors/bp-monitors/

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Out-of-office BP Measurements

- ABPM has better predictive ability than OBPM and is the recommended out-of-office measurement method.
- HBPM has better predictive ability than OBPM and is recommended if ABPM is not tolerated, not readily available or due to patient preference.
- Identifies white coat hypertension (as well as diagnosing masked hypertension)

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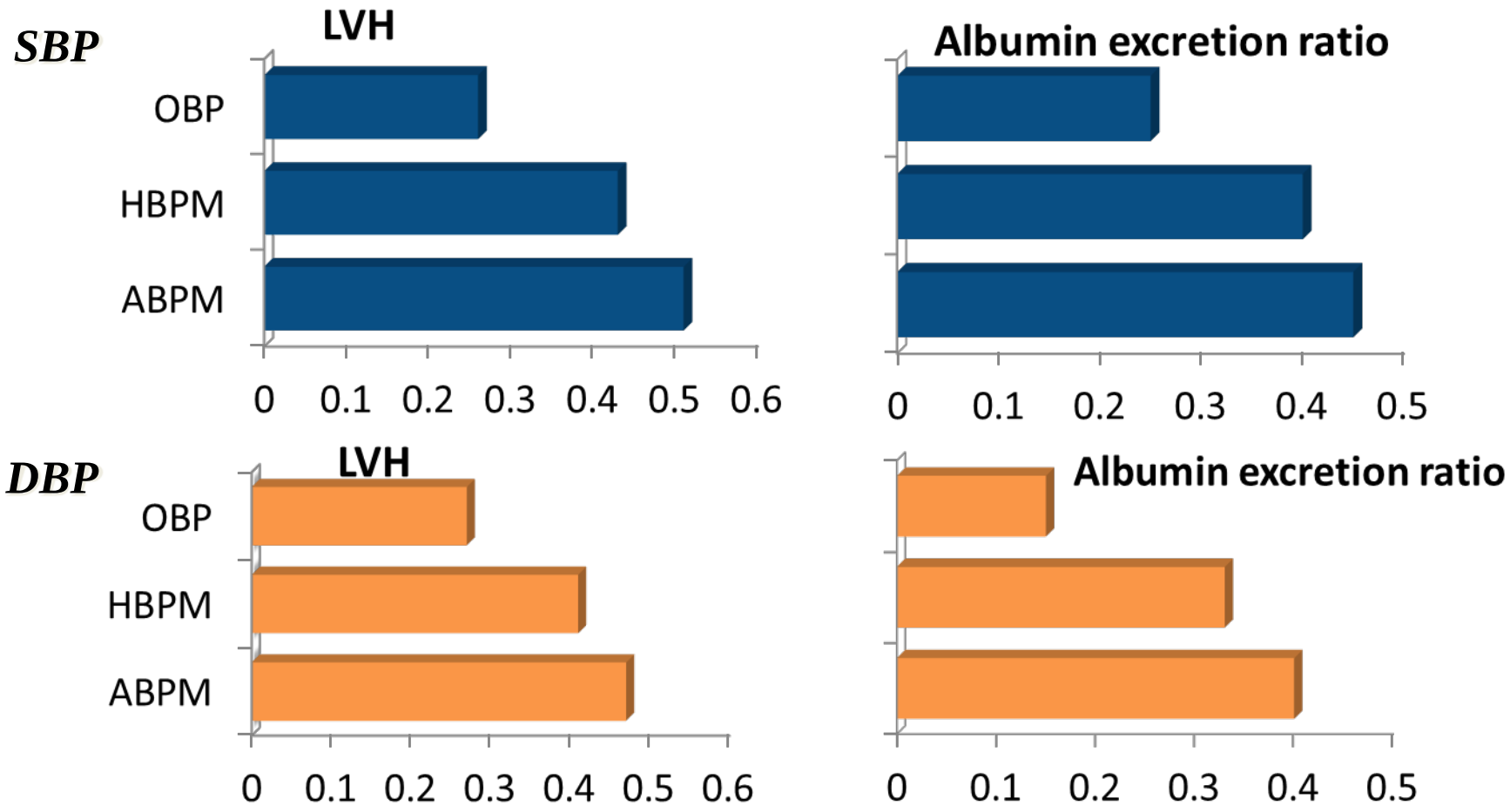
Out-of-office BP measurements are more highly correlated with BP-related risk



Mule et al. *J Cardiovasc Risk* 2002;9:123-9.

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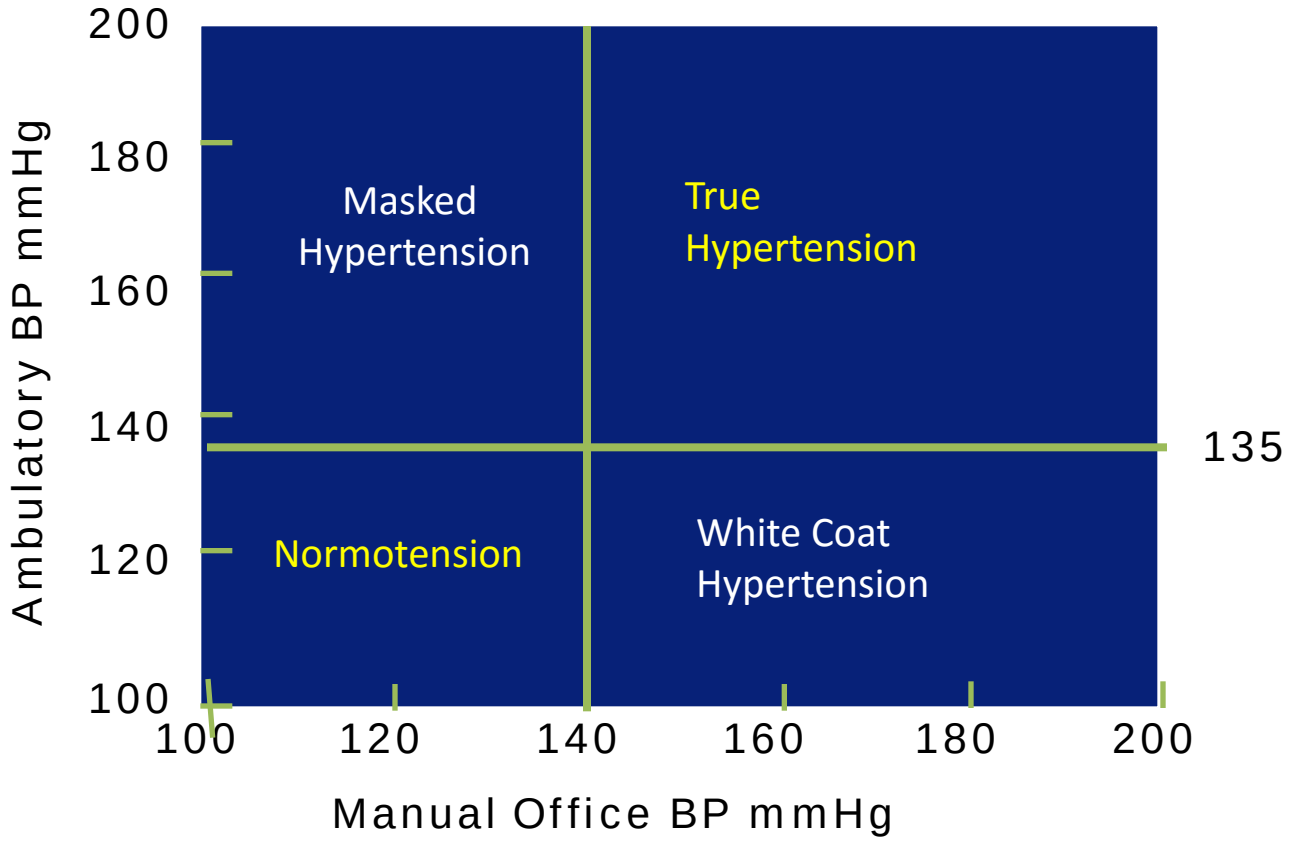
Only relying on office pressures misses out on white coat and masked hypertension



From Pickering et al. *Hypertension* 2002;40:795-796

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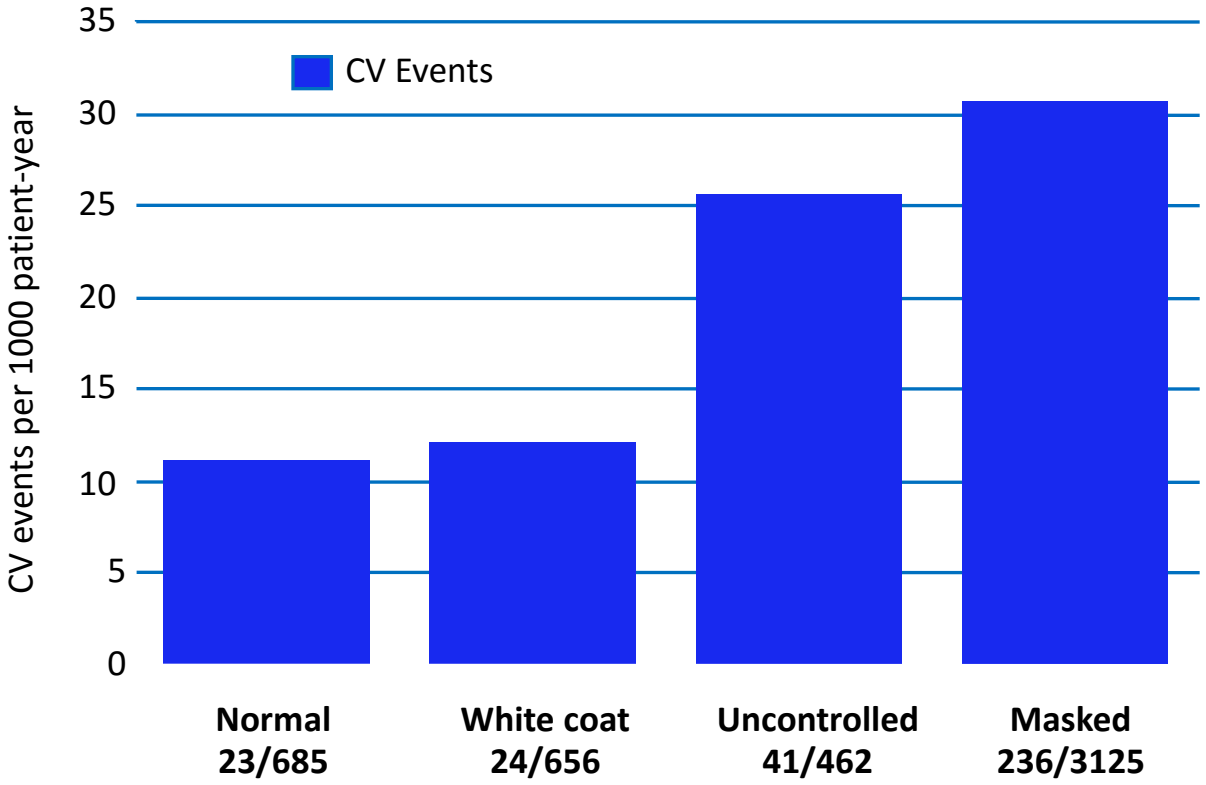
The prognosis of *white coat* and *masked* hypertension



Okhubo et al. *J. Am. Coll. Cardiol.* 2005;46;508-515

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White coat hypertension: risk factors

- women
- older adults
- non-smokers
- subjects recently diagnosed with hypertension with a limited number of routine OBPM
- subjects with mild hypertension
- pregnant women
- subjects ***without*** evidence of target organ damage

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Franklin SS, et al. Hypertension 2013;62:982-7
Lovibond K, et al. Lancet 2011;378:1219-30

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Masked hypertension: risk factors

- high normal clinic BPs
- older adults
- males
- higher BMI
- smoker
- excess alcohol consumption
- diabetes
- peripheral arterial disease
- orthostatic hypotension
- LVH

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Hanninen MR et al, J Hypertens. 2011;29:1880-88
Barochiner J et al. Am J Hypertens. 2013;28:872-78
Andalib A et al. Intern M ed J. 2012;42:260-66

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Summary of evidence

- Out-of-office is needed to identify white coat hypertension (and to rule out masked hypertension)
- ABPM has better predictive ability than OBPM
- HBPM has better predictive ability than OBPM

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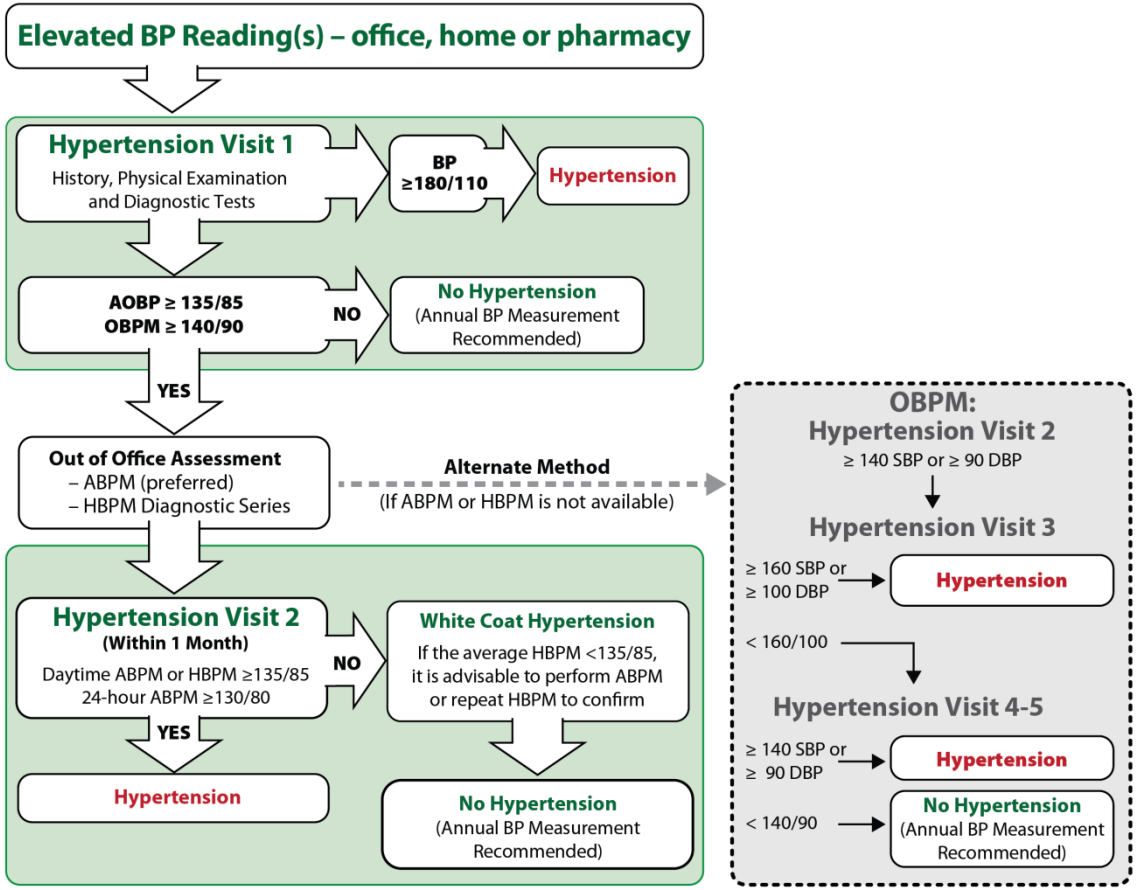
Criteria for the diagnosis of hypertension and recommendations for follow-up: summary



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