

# Hypertension in a nutshell

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# Disclosures

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# Quick facts

- 1 in 4 (25.5%) Canadians adults have hypertension Canadian Chronic Disease Surveillance System (2016–17)
- Frequency and timing of screening can be tailored to each patient's risk of hypertension. Risk factors for hypertension are:
  - Diabetes mellitus
  - Chronic kidney disease
  - Low level of consumption of fresh fruits and vegetables
  - Sedentary behaviour

# Prevalence of Hypertension in Canada

21.8%

Number of Canadian adults 18+ suffering from hypertension

3.3%\*

of those age 18 to 39

21.8%

of those age 40 to 59

52.4%

of those age 60 to 70

**...have hypertension.**

\*Interpret with caution; coefficient of variation between 16.6% and 33.3%.  
Data are from the Canadian Health Measures Survey, Cycle 2, Statistics Canada.

# Questions to ask on history-- Review of systems

- Headache
- Visual changes
- Chest pain, dyspnea, paroxysmal nocturnal dyspnea, orthopnea
- Leg swelling, exertional calf pain
- Neurological deficits, vertigo
- Obstructive sleep apnea
- Palpitations, excessive sweating, weight changes

# Questions to ask on history-- Past medical history

- CAD
- PAD
- CKD
- DM2
- Dyslipidemia
- Obesity
- Cognitive changes

# Questions to ask on history-- Medications/substances

## **Prescription Drugs**

- Nonsteroidal anti-inflammatory drugs (NSAIDs), cyclo-oxygenase-2 inhibitors (COX-2)
- Corticosteroids and anabolic steroids
- Oral contraceptive and sex hormones
- Decongestants
- Serotonin-norepinephrine reuptake inhibitors (SNRIs), selective serotonin reuptake inhibitors (SSRIs)

## **Other substances**

- Licorice root
- Stimulants including cocaine
- Salt
- Excessive alcohol intake

# Questions to ask on history-- Risk factors


- **Non-modifiable:**

- Age >55
- Male
- Family history of premature cardiovascular disease
  - (age <55 in men and <65 in women)

- **Modifiable:**

- Sedentary lifestyle
- Smoker
- Obesity
- Poor diet, salt intake
- Diabetes/prediabetes
- Stress
- Alcohol, drugs





# Hypertension 2020: Diagnosis

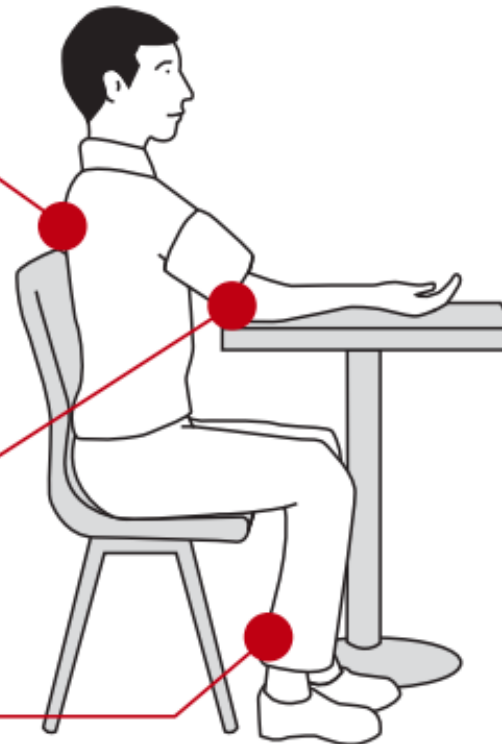
- **The diagnosis of hypertension should be based on out-of-office measurements; in the office, use automated office BP monitoring (AOBP)**

# BLOOD PRESSURE MEASUREMENT TECHNIQUE



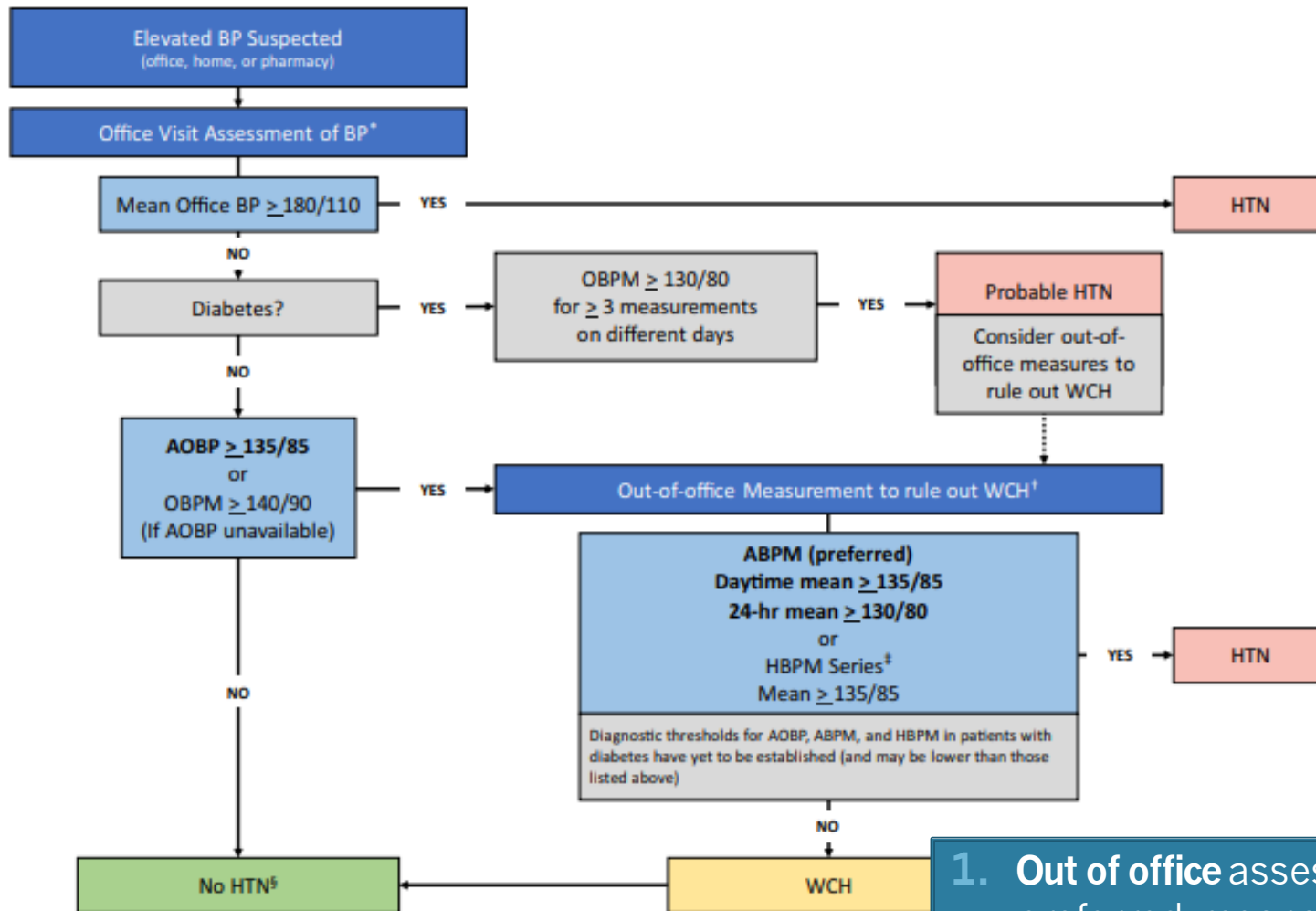
**Accurate diagnosis begins with accurate measurement:**

- ✓ Sitting position
- ✓ Back supported
- ✓ Arm bare and supported
- ✓ Use a cuff size appropriate for your arm
- ✓ Middle of the cuff at heart level
- ✓ Lower edge of cuff 3 cm above elbow crease
- ✓ Do not talk or move before or during the measurement
- ✓ Legs uncrossed
- ✓ Feet flat on the floor



# Physical exam

- Neurological:
  - Check for abnormal cranial nerve exam, papilledema, cotton wool spots, retinal hemorrhages
- Cardiovascular:
  - Heart murmurs, renovascular bruits, carotid bruits, decreased or absent peripheral pulses, extremity swelling



**ABPM** = ambulatory blood pressure measurement  
**AOBP** = automated office blood pressure  
**OBPM** = office BP measurement

1. **Out of office** assessment is the preferred means of hypertension diagnosis
2. **Measurement using electronic upper arm devices** is preferred over auscultation

# Diagnostic tests after first visit

1. Urinalysis
2. Potassium, sodium and creatinine
3. Fasting blood glucose/glycated hemoglobin (A1c)
4. Serum total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), non-HDL cholesterol, and triglycerides; (fasting or non-fasting)
5. Standard 12-lead ECG

\*Routine testing of microalbuminuria (ACr) in patients with hypertension by **without diabetes or renal disease** is not supported by current evidence.

# Target organ damage

- **Cardiovascular disease** – MI, angina, CHF, LVH
- **Cerebrovascular disease** – Stroke, TIA, Vascular dementia, hemorrhage
- **Hypertensive retinopathy**
- **Chronic kidney disease** – eGFR < 60 or albuminuria
- **Peripheral vascular disease** – Intermittent claudication, ABI < 0.9

# Target organ damage

## Global Cardiovascular Risk Assessment

Global cardiovascular risk should be assessed. Multifactorial risk assessment models can be used to more accurately predict global cardiovascular risk and antihypertensive therapy.

Assessments can be done through risk calculators like:

- [www.ccs.ca/en/resources/calculators-forms](http://www.ccs.ca/en/resources/calculators-forms)
- [www.myhealthcheckup.com](http://www.myhealthcheckup.com)
- [www.score-canada.ca](http://www.score-canada.ca)

## Improve Risk Factor Modification

Inform patients of their global risk and consider using analogies that describe comparative risks like “cardiovascular age”, “vascular age”, or “heart age”.

# Hypertensive urgency and emergency

- **Urgency:**

- Asymptomatic diastolic BP  $\geq$  130 mmHg

- **Emergency:**

- Hypertensive encephalopathy
- Acute aortic dissection
- Acute left ventricular failure
- Acute coronary syndrome
- Acute kidney injury
- Intracranial hemorrhage
- Acute ischemic stroke
- Pre-eclampsia/eclampsia
- Catecholamine-associated hypertension



# Treatment thresholds and targets

Hypertension Canada stratifies patients by cardiovascular risk and, based on that risk, there are different thresholds and targets for treatment.



## Hypertension Canada *High-Risk Patient\**

### Diabetes Mellitus

**Moderate-to-high Risk**  
(multiple cardiovascular risk factors & 10-year global risk > 15%)

**Low Risk**  
(no TOD or cardiovascular risk factors)

## \* Hypertension Canada *High-Risk Patient*

Individuals with one or more of the following clinical indications should consent to intensive management:

- ✓ Clinical or sub-clinical cardiovascular disease

**OR**

- ✓ Chronic kidney disease (non-diabetic nephropathy, proteinuria <1g/d, \*estimated glomerular filtration rate 20-59 mL/min/1.73m<sup>2</sup>)

**OR**

- ✓ Estimated 10-year global cardiovascular risk ≥15%

**OR**

- ✓ Age ≥75 years

# Summary of targets

**Table 5 Blood pressure thresholds for initiation of antihypertensive therapy and treatment targets in adults**

<b>Patient population</b>	<b>BP threshold (mm Hg) for initiation of antihypertensive therapy</b>	<b>BP target (mm Hg) for treatment</b>
Low risk (no target organ damage or cardiovascular risk factors)	SBP $\geq$ 160 (Grade A) DBP $\geq$ 100 (Grade A)	SBP < 140 (Grade A) DBP < 90 (Grade A)
High risk of cardiovascular disease*	SBP $\geq$ 130 (Grade B)	SBP < 120 (Grade B)
Diabetes mellitus	SBP $\geq$ 130 (Grade C) DBP $\geq$ 80 (Grade A)	SBP < 130 (Grade C) DBP < 80 (Grade A)
All others	SBP $\geq$ 140 (Grade C) DBP $\geq$ 90 (Grade A)	SBP < 140 (Grade A) DBP < 90 (Grade A)

BP, blood pressure; DBP, diastolic blood pressure; SBP, systolic blood pressure.



# New Guideline Post-SPRINT

- For high-risk patients, aged  $\geq 50$  years, with systolic BP levels  $\geq 130$  mm Hg, intensive management to target a systolic BP  $\leq 120$  mm Hg should be considered
- Intensive management should be guided by automated office BP measurements
- Patient selection for intensive management is recommended and caution should be taken in certain high-risk groups

# Usual Office BP Threshold Values for Initiation of Pharmacological Treatment

Population	SBP	DBP
<b>High Risk (SPRINT population) #</b>	≥ 130	NA
Diabetes	≥ 130	≥ 80
Moderate *	≥ 140	≥ 90
Low risk (no TOD or CV risk factors)	≥ 160	≥ 100

**AOBP** = automated office blood pressure  
**TOD** = target organ damage  
**SBP** = systolic blood pressure  
**DBP** = diastolic blood pressure

# Based on AOBP

\*AOBP threshold ≥ 135/85 mmHg

# Recommended Office BP Treatment Targets

Treatment consists of health behaviour ± pharmacological management

Population	SBP	DBP
<b>High Risk #</b>	≤ 120	NA
Diabetes	< 130	< 80
All others*	< 140	< 90

# Based on AOBP

\*AOBP threshold ≥ 135/85 mmHg

# Impact of health behaviours on blood pressure

Intervention	Systolic BP (mmHg)	Diastolic BP (mmHg)
Diet and weight control	-6.0	-4.8
Reduced salt/sodium intake	- 5.4	- 2.8
Reduced alcohol intake (heavy drinkers)	-3.4	-3.4
DASH diet	-11.4	-5.5
Physical activity	-3.1	-1.8
Relaxation therapies	-3.7	-3.5
Multiple interventions	-5.5	-4.5

# Health behaviours in adults with hypertension--Summary



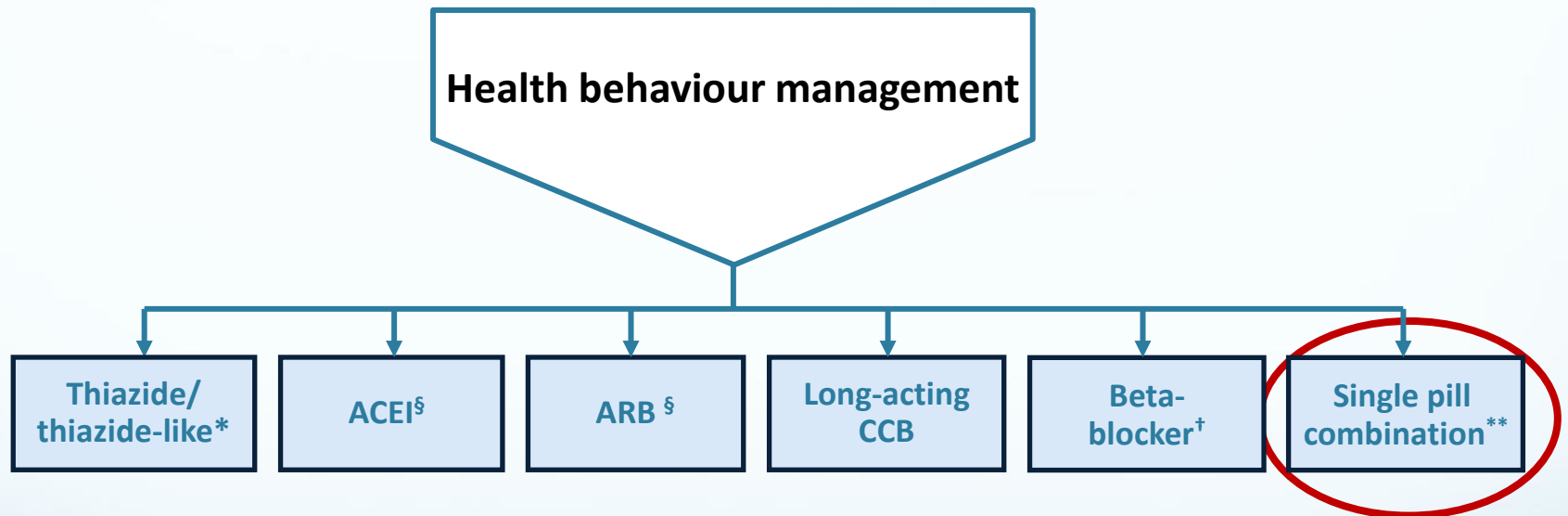
<b>Intervention</b>	<b>Target</b>
Reduce foods with added sodium	→ 2000 mg /day
Weight loss	BMI <25 kg/m <sup>2</sup>
Alcohol restriction	≤ 2 drinks/day
Physical activity	30-60 minutes 4-7 days/week
Dietary patterns	DASH-like diet
Smoking cessation	Smoke free environment
Waist circumference	Men <102 cm    Women <88 cm
Relaxation therapies	Individualized cognitive behavioural interventions in whom stress plays a role in elevating BP



# First Line Treatment of Adults with Systolic/Diastolic Hypertension Without Other Compelling Indications

**TARGET <135/85 mmHg AOBP or <140/90 non-AOBP**

*INITIAL TREATMENT*



\* Longer-acting (thiazide-like) diuretics are preferred over shorter-acting diuretics

† BBs are not indicated as first line therapy for age 60 and above

§ACEI/ARBs are contraindicated in pregnancy and caution is required in prescribing to women of child bearing potential

**\*\*Recommended single pill choices are those in which an ACEI is combined with a CCB, an ARB with a CCB, or an ACE-I or ARB with a diuretic**

# Pharmacotherapy options

- Thiazide diuretics:
  - e.g., Chlorthalidone: risk of hypokalemia
- ACE inhibitors:
  - e.g., Ramipril: ACEI associated cough, monitor renal function, can cause hyperkalemia (check lytes+Cr week after starting)
- ARB
  - e.g., Irbesartan: monitor renal function, can cause hyperkalemia (monitor as per above)
- CCB
  - e.g., Amlodipine: leg swelling, constipation
- Beta-blocker
  - e.g., Bisoprolol: fatigue, not generally for use over age 60


# Comorbidities and pharmacotherapy

**Table 7 Considerations in the individualization of pharmacological therapy in adults**

	Initial therapy	Second-line therapy
Hypertension without other compelling indications		
Diastolic hypertension with or without systolic hypertension	Monotherapy or SPC. Recommended monotherapy choices include thiazide/thiazide-like diuretics (with longer-acting diuretics preferred), $\beta$ -blockers, ACE inhibitors, ARBs, or long-acting CCBs. Recommended SPC choices include combinations of an ACE inhibitor with CCB, ARB with CCB, or ACE inhibitor/ARB with a diuretic (consider statins in selected patients)	Combination of first-line drugs
Isolated systolic hypertension without other compelling indications	Thiazide/thiazide-like diuretics, ARBs, or long-acting dihydropyridine CCBs	Combinations of first-line drugs
Diabetes mellitus		
Diabetes mellitus with microalbuminuria, * renal disease, cardiovascular disease, or additional cardiovascular risk factors	ACE inhibitors or ARBs	Additional use of a dihydropyridine CCB is preferred over a thiazide/thiazide-like diuretic
Diabetes mellitus not included in the above category	ACE inhibitors, ARBs, dihydropyridine CCBs, or thiazide/thiazide-like diuretics	Combination of first-line drugs. If combination with ACE inhibitor is being considered, a dihydropyridine CCB is preferable to a thiazide/thiazide-like diuretic
Cardiovascular disease		
Coronary artery disease	ACE inhibitors or ARBs; $\beta$ -blockers or CCBs for patients with stable angina	When combination therapy is being used for high-risk patients, an ACE inhibitor/dihydropyridine CCB is preferred
Recent myocardial infarction	$\beta$ -Blockers and ACE inhibitors (ARBs if ACE inhibitor-intolerant)	Long-acting CCBs if $\beta$ -blocker contraindicated or not effective

# Comorbidities and pharmacotherapy

Heart failure	ACE inhibitors (ARBs if ACE inhibitor-intolerant) and $\beta$ -blockers. Aldosterone antagonists (mineralocorticoid receptor antagonists) may be added for patients with a recent cardiovascular hospitalization, acute myocardial infarction, elevated BNP or NT-proBNP level, or NYHA class II-IV symptoms	ACE inhibitor and ARB combined. Hydralazine/isosorbide dinitrate combination if ACE inhibitor and ARB contraindicated or not tolerated. Thiazide/thiazide-like or loop diuretics are recommended as additive therapy; dihydropyridine CCB can also be used. A combined ARB/nepriylsin-inhibitor is recommended (in place of an ACE inhibitor or ARB) in symptomatic patients with hypertension and HFrEF according to standard guideline-based therapies
LVH	ACE inhibitor, ARB, long-acting CCB, or thiazide/thiazide-like diuretic	Combination of first-line agents
Past stroke or TIA	ACE inhibitor and a thiazide/thiazide-like diuretic combination	Combination of first-line agents
Nondiabetic chronic kidney disease		
Nondiabetic chronic kidney disease with proteinuria <sup>†</sup>	ACE inhibitors (ARBs if ACE inhibitor-intolerant) if there is proteinuria Diuretics as additive therapy	Combinations of first-line agents



# Secondary causes of Hypertension

- Renal artery stenosis
- Sleep apnea
- Hypothyroidism, Hyperthyroidism
- Coarctation of aorta
- Hyperaldosteronism
- Cushing's disease
- Hyperparathyroidism
- Drug side effects

# Investigations for secondary HTN

- TSH
- Calcium, albumin, PTH
- Renal doppler
- Dexamethasone suppression test
- Sleep study
- Plasma aldosterone: plasma renin ratio
- Urine for metanephrines
- Echocardiogram

# The treatment of hypertension is all about vascular protection

*Statins are recommended in high risk hypertensive patients based on having established atherosclerotic disease or at least 3 of the following:*

- Male
- 55 y or older
- Smoking
- Type 2 Diabetes
- Total-C/HDL-C ratio of 6 or higher
- Premature Family History of CV disease
- Previous Stroke or TIA
- LVH
- ECG abnormalities
- Microalbuminuria or Proteinuria
- Peripheral Vascular Disease

ASCOT-LLA *Lancet* 2003;361:1149-58

# Conclusion

- High prevalence, with significant mortality and morbidity
- Routine screening and monitoring is important
- Lifestyle and pharmacological therapies available!



# Guidelines/references

- [www.hypertension.ca](http://www.hypertension.ca) for Hypertension 2020 Guidelines and resources
- <https://canadiantaskforce.ca/tools-resources/hypertension/hypertension-clinician-algorithm/> for Canadian Task Force 2013 Guidelines and resources