



Hypertension 2016

Case Based Approach

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Learning objectives

1. What is new in HTN
2. How to Dx HTN
3. Update in guidelines
4. Refractory HTN
5. When to refer?



Cases

1. 59yo man DM-2, + ACR, no CAD, BP 145/94, rest BW normal
2. 22yo woman healthy BP 150/92, no CRF or EOD
3. 50yo woman with BP 165/98, no CRF, thin, creat normal K 3.4
4. 70yo man CHF (Ef 22%), no DM, Cr 65 BP 140/90, on Furosemide, NTP...
5. 74yo ischemic stroke BP 170/94; no DM or CAD, creat/K normal



Benefits of lowering mild to moderate blood pressure (BP)

For every 10/5 mmHg lowering of BP^{1,2,3}	Percent reduction
Stroke	35–40%
Myocardial infarction (MI)	20–25%
Heart failure (HF)	50%

1. MacMahon S, Peto R, Cutler J *et al. Lancet* 1990;335:765-74.
2. Collins R, Peto R, MacMahon S *et al. Lancet* 1990;335:827-38.
3. Staessen JA, Fagard R, Lutgarde T *et al. Lancet* 1997;350:757-64.



Causes

- **Essential HTN**
 - > 95%
- Others/Secondary causes
 - Cardiac
 - **Endocrine**
 - **Primary Hyperaldosteronism**
 - Renal
 - Drugs/Toxins
 - Salt, EtOH, NSAIDs, Herbals/Licorice, OTCs, OCPs
 - OSA
 - Pregnancy



Usual Office BP Threshold Values for Initiation of Pharmacological Treatment

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

TOD = target organ damage

*AOBP threshold $\geq 135/85$



Recommended Office BP Treatment Targets

Treatment consists of health behaviour \pm pharmacological management

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

* Target BP with AOBP $< 135/85$



Benefit vs harm of intensive and standard systolic pressure control in SPRINT

Outcome	Absolute risk reduction	Number needed to treat
Primary outcome	-1.6%	61
Heart failure	-0.8%	125
Cardiovascular mortality	-0.6%	167
All-cause mortality	-1.2%	83

	Absolute risk increase	Number needed to harm
Hypotension	+1.0%	100
Syncope	+0.6%	167
Electrolyte abnormalities	+0.8%	125
Acute kidney injury	+1.6%	62

Information from SPRINT Research Group; Wright JT Jr, Williamson JD, Whelton PK, et al. A randomized trial of intensive versus standard blood-pressure control. *N Engl J Med* 2015; 373:2103–2116.



New thresholds/targets for the high risk patient post-SPRINT: *who does this apply to??*

- Clinical or sub-clinical cardiovascular disease
OR
- CKD(non-diabetic nephropathy, proteinuria <1 g/d, * eGFR 20-59 mL/min/1.73m²)
OR
- †Estimated 10-year global cardiovascular risk ≥15%
OR
- Age ≥ 75 years

Patients with one or more clinical indications should consent to intensive management.

* Four variable MDRD equation

† Framingham Risk Score, D'Agastino, Circulation 2008



2015 Recommendation on BP Measurement

AOBP:

- Electronic (oscillometric) devices in upper arm
- HCP outside the room/area (mitigates white coat effect)
- Multiple readings
- Mean automatically calculated



Predictive value of AOBP

AOBP predicts end-organ damage

- Systolic AOBP correlates with **LVMi** similarly to awake ABPM
- AOBP & 24-h ABPM have similar predictive ability for **uACR**
- AOBP is more strongly associated with **cIMT** (compared to OBPM)

cIMT: Carotid Intima Media Thickness

LVMi: Left Ventricular Mass Index

Campbell NRC, et al. J Hum Hypertens 2007;21:588-90; Andreadis EA, et al. Am J Hypertens 2011;24:661-6; Andreadis EA, et al. Am J Hypertens 2012;25:969-73.

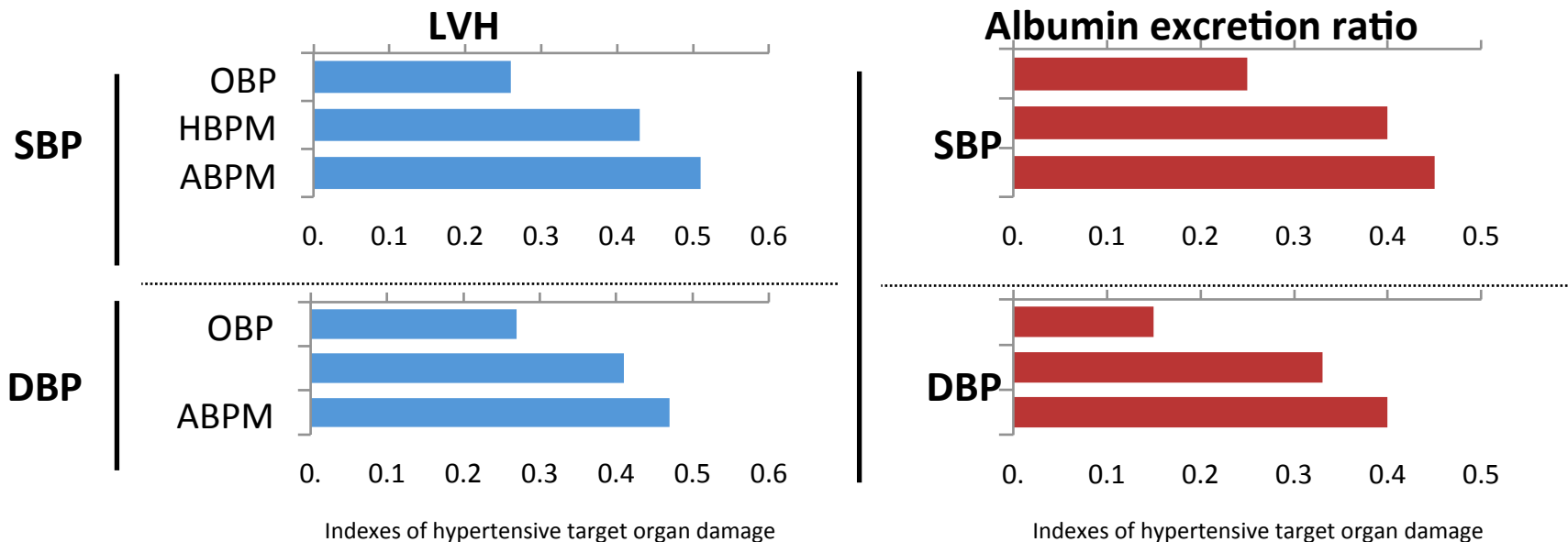


Out-of-Office BP Measurements

- ABPM > predictive ability than OBPM and is the recommended out-of-office measurement method
- HBPM has > predictive ability than OBPM & recommended if ABPM is not tolerated, readily available or due to patient preference
- Identifies white coat hypertension and masked HTN



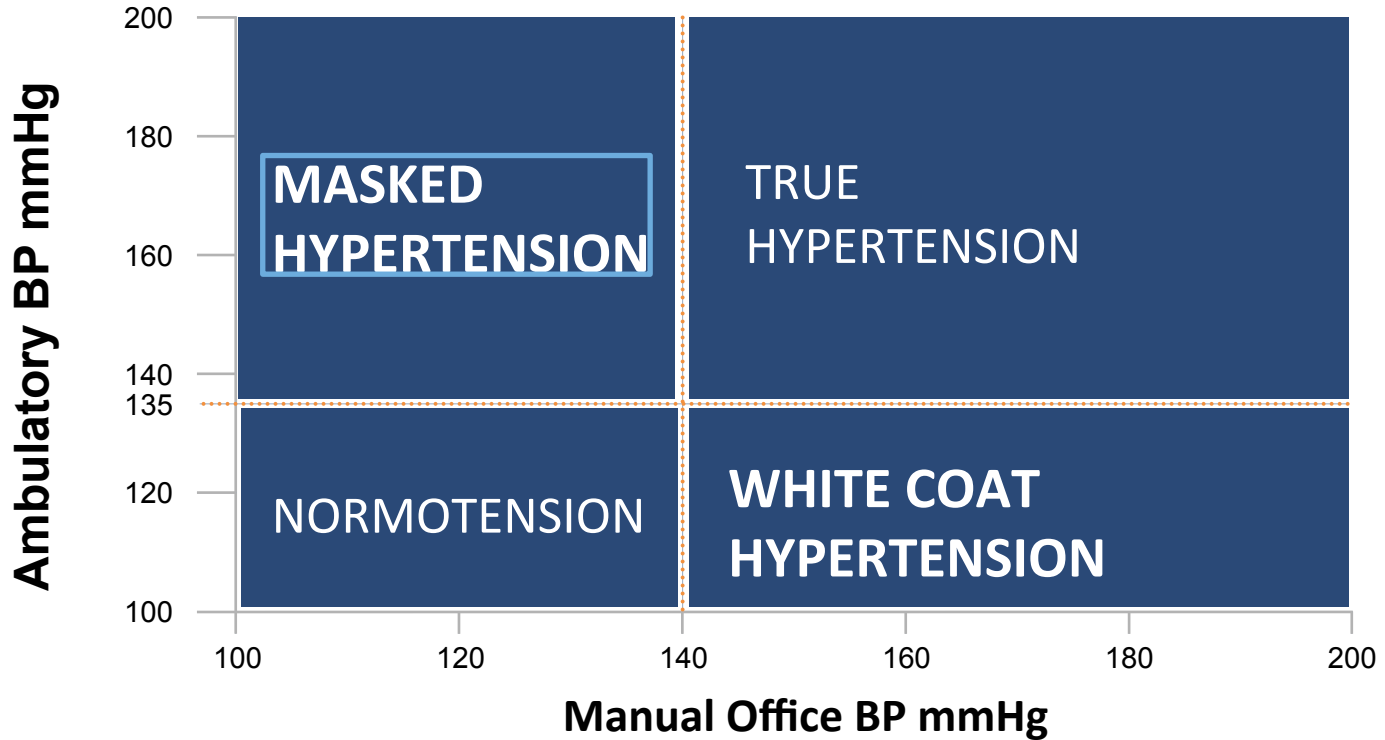
Out-of-office BP measurements are more highly correlated with BP-related risk



Value of Home Blood Pressures as Predictor of Target Organ Damage in Mild Arterial Hypertension
Mulè G. et al. *J Cardiovasc Risk* 2002;9:123-9.



White Coat and Masked Hypertension



Adapted from CHEP. www.hypertension.ca. Derived from Pickering *et al. Hypertension* 2002; 40: 795-796.



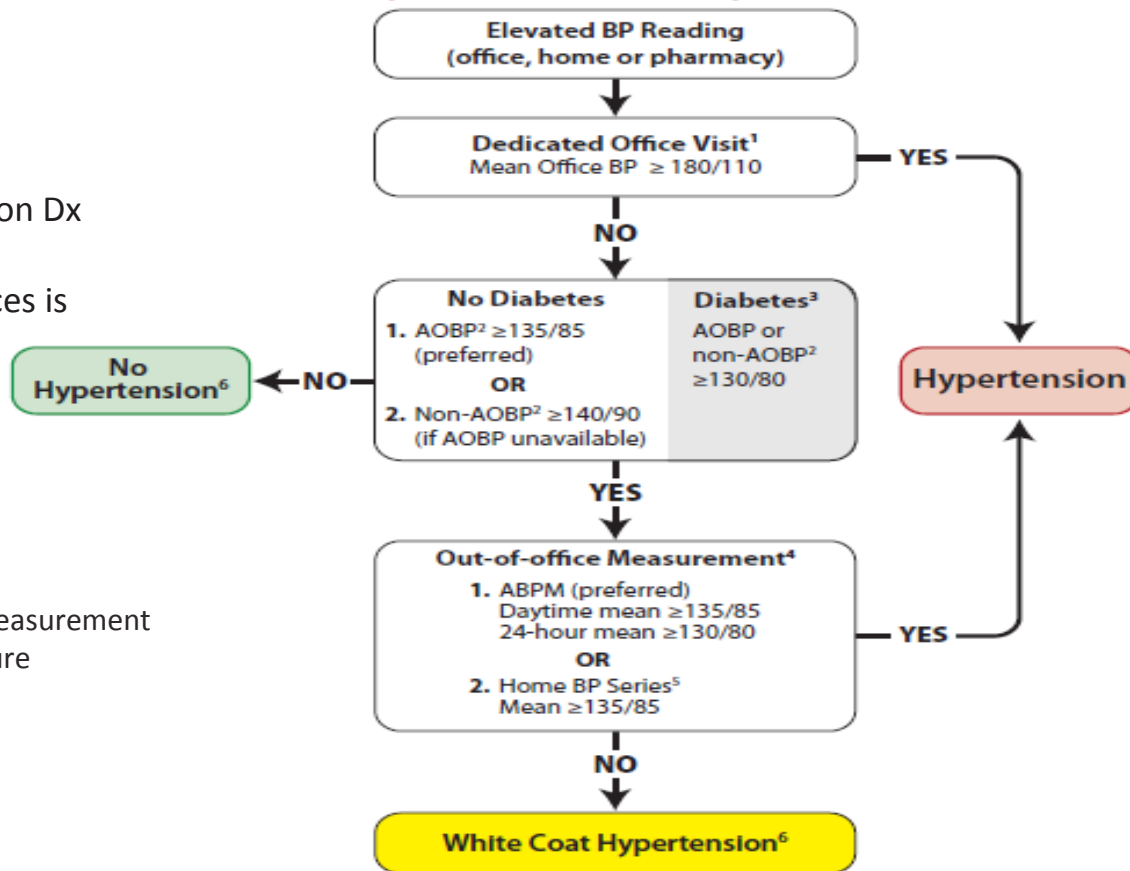
Evaluation

1. End Organ Damage
 2. Overall CV Risk
 3. r/o Secondary causes
- History & PE
 - Labs
 - U/A, glucose, A1c, creatinine/GFR, lytes (K+)
 - Fasting Lipids
 - ECG
 - Other tests as indicated, uMicroalbumin, Echo...



Hypertension Diagnostic Algorithm

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



ABPM: Ambulatory Blood Pressure Measurement

AOBP: Automated Office Blood Pressure



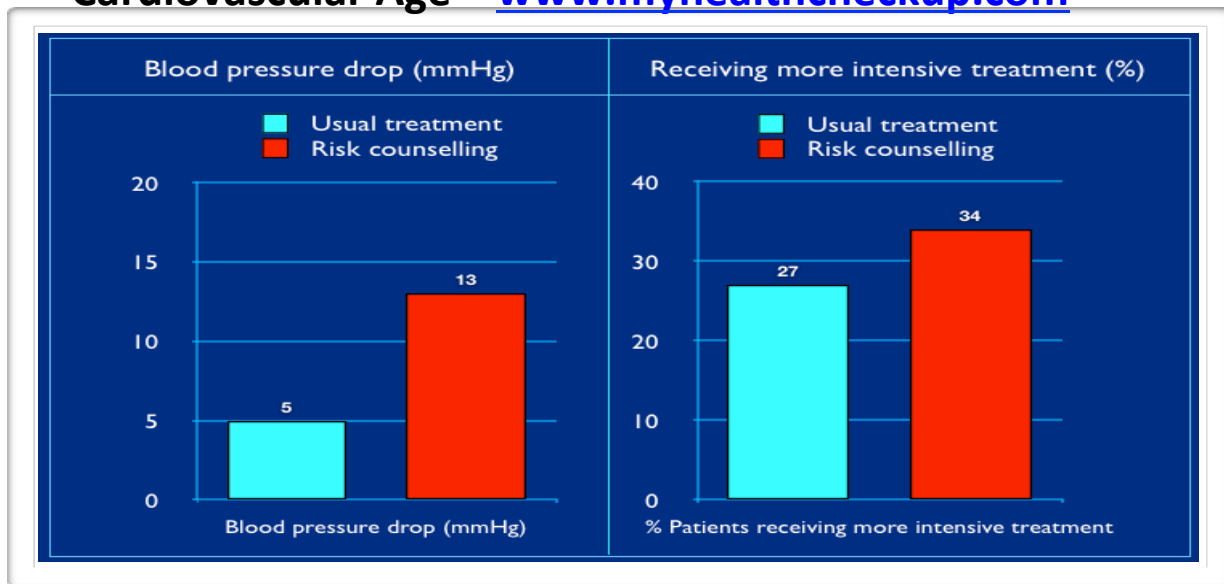
Impact of health behaviours on blood pressure

Intervention	Systolic BP (mmHg)	Diastolic BP (mmHg)
Diet and weight control (BMI < 25; WC < 90-100**)	-6.0	-4.8
Reduced salt/sodium intake < 2g/d	- 5.4	- 2.8
Reduced alcohol intake (heavy drinkers) < 2 drinks/day	-3.4	-3.4
DASH diet	-11.4	-5.5
Physical activity (30-60 minutes 4-7 days/week)	-3.1	-1.8
Relaxation therapies	-3.7	-3.5
Multiple interventions	-5.5	-4.5



Impact of discussing coronary risk with patients on blood pressure treatment

Informing Patients of Their Global Risk improves BP Control
Cardiovascular Age™ www.myhealthcheckup.com



Grover SA, et al. *J Gen Intern Med* 2009;24(1):33-9.



Low Sodium

©2000 Shannon Burns

www.shannonburns.com



"How's the low-sodium diet coming along?"



It's Lunch Time!



Sodium in Lunch

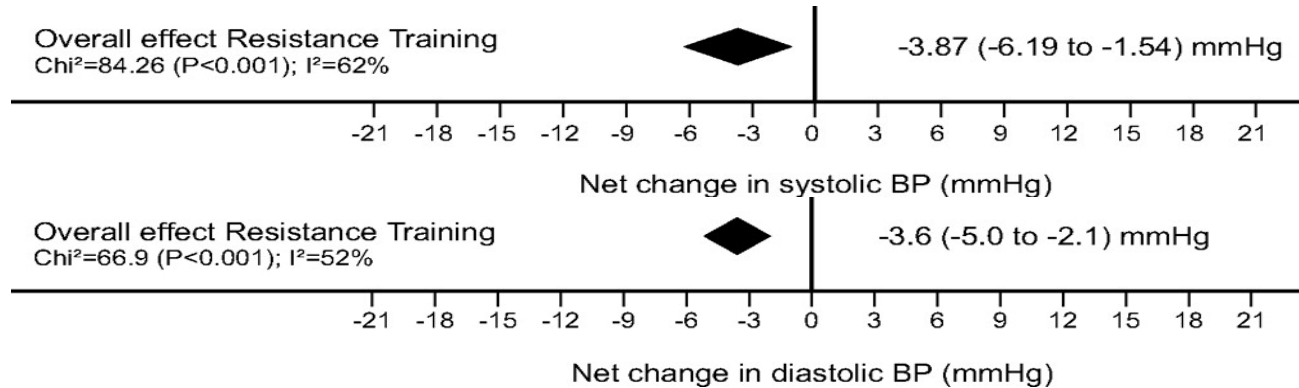
	Sodium
Deli Turkey (4 oz)	900 mg
Wheat Bread (2 slices)	320 mg
Soup (1 bowl)	700 mg
Balsamic Vinaigrette Dressing (2 Tbsp)	200 mg
Salad (2 cups)	65 mg
Total sodium	2185 mg

Top 10 Sources of Sodium

- (1) Bread & rolls
- (2) Cold cuts & cured meats
- (3) Pizza
- (4) Poultry
- (5) Soups
- (6) Sandwiches
- (7) Cheese
- (8) Pasta dishes
- (9) Meat dishes
- (10) Snacks



Effect of resistance training on BP: *meta-analysis in normotensives and hypertensives*



- **Overall reduced BP BUT no significant BP changes in hypertensives**
 - **NO evidence for deterioration in BP control in hypertensives NOR adverse effects**
- Cornelissen et al, Hypertension. 2011 Nov;58(5): 950-8.



Drugs

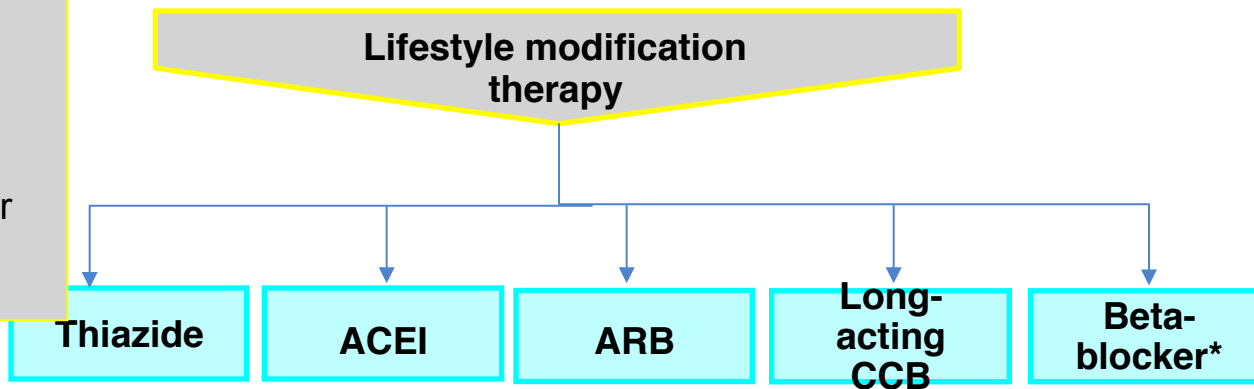
- Thiazides
 - Long term safety, efficacy
 - -chlorthalidone, indapamide, HCTZ
- ACEI
 - Cough, angioedema, K/Creat
- ARBs
 - As above but no cough
- DHP-CCBs
 - Edema, HA
- Beta Blockers
 - Asthma, bradycardia
- Alpha blockers
 - syncope
- ***Spironolactone***
 - K/Creat, gynecomastia
- **Combination Therapy**



Treatment of Adults with Systolic/Diastolic Hypertension without Other Compelling Indications

IF BLOOD PRESSURE IS NOT CONTROLLED CONSIDER

- Nonadherence
- Secondary HTN
- Interfering drugs or lifestyle
- White coat effect



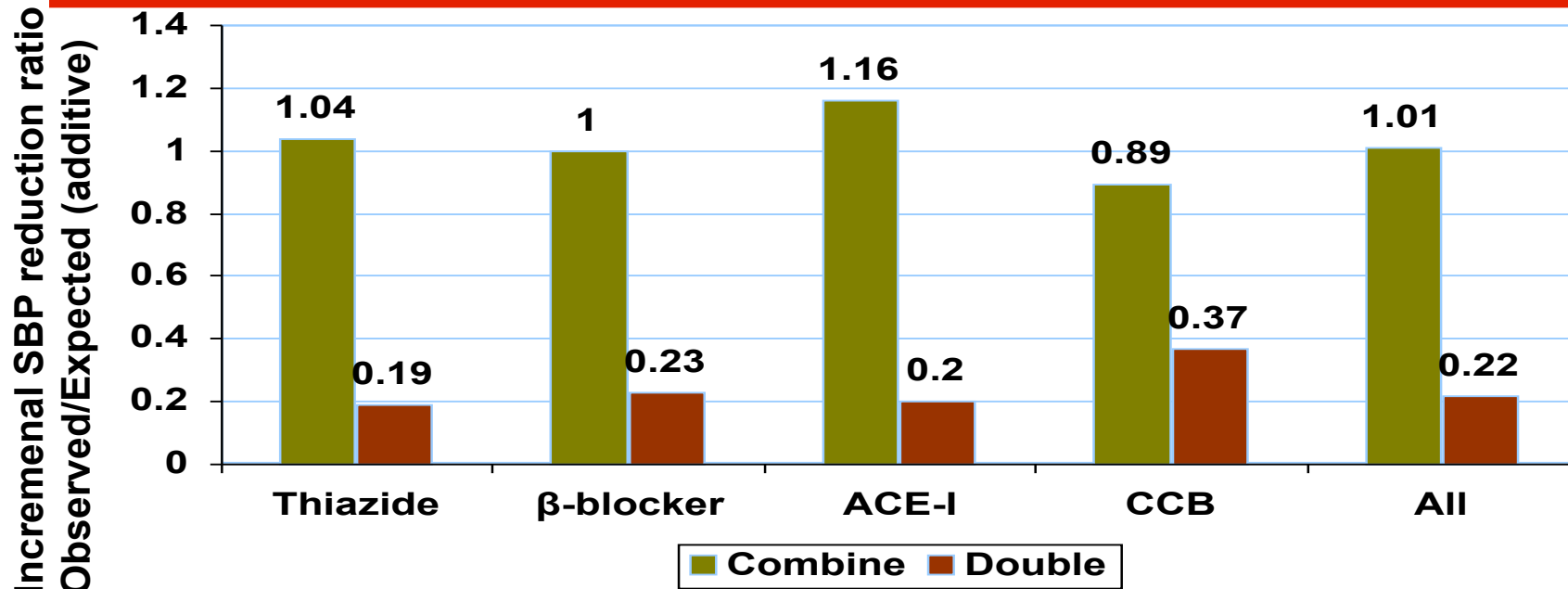
A combination of 2 first line drugs may be considered as initial therapy if the blood pressure is ≥ 20 mmHg systolic or ≥ 10 mmHg diastolic above target

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

ACEI, ARB and direct renin inhibitors are contraindicated in pregnancy and caution is required in prescribing to women of child bearing potential



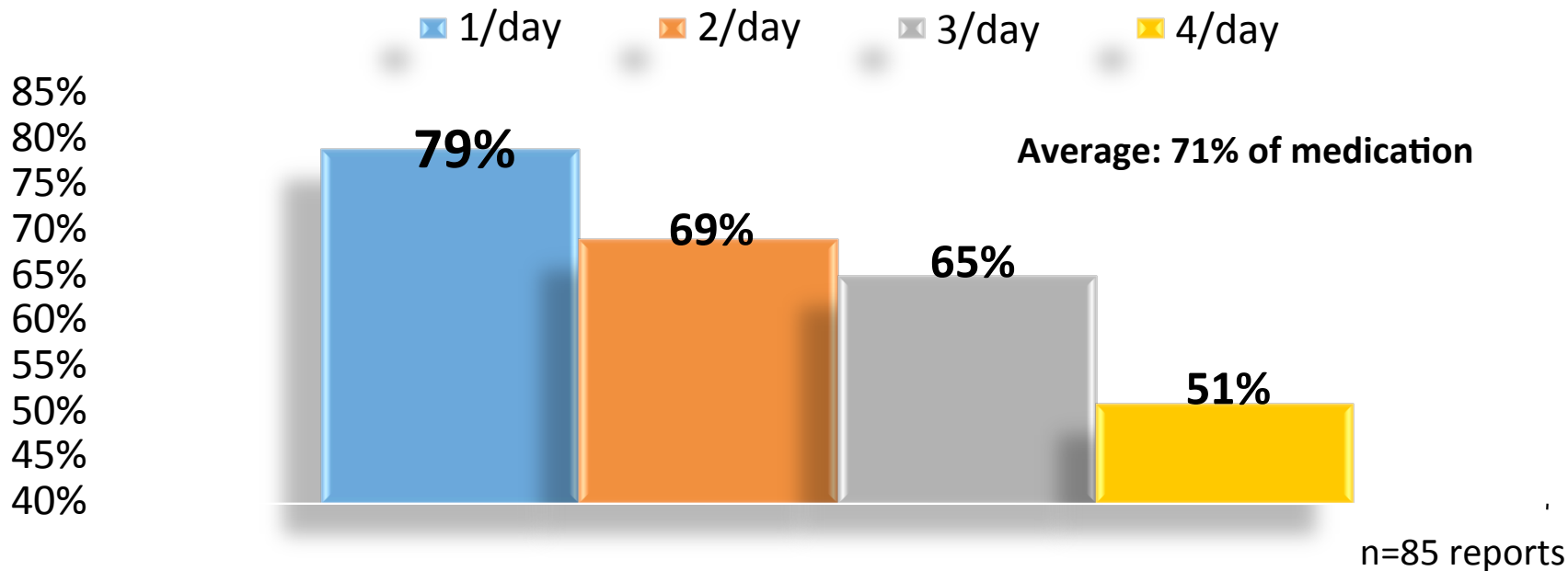
Ratio of Incremental SBP lowering effect at “standard dose” – Combine or Double?



Wald et al. Combination Versus Monotherapy for Blood Pressure Reduction,
The American Journal of Medicine, Vol 122, No 3, March 2009



Adherence according to # of daily doses (%)





Adherence improved by a multi-pronged approach

- Assess adherence at every visit
- Take pills on regular schedule with routine daily activity e.g. brushing teeth
- Simplify regimens using long-acting once-daily dosing
- Utilize fixed-dose combination pills
- Utilize unit-of-use packaging e.g. blister packaging
- Replacing with single pill combinations



Strong Evidence for Vascular Protection

- **Smoking Cessation**
- **Statins**
- **Low dose ASA**



Methods of Risk Assessment

- Clinical impression
- Risk factor counting
- Risk calculation or equation tools
 - Framingham hard coronary heart disease (CHD)
<http://hp2011.nhlbihin.net/atp/iii/calculator.asp?usertype=prof>
 - SCORE Canada – Systematic Cerebrovascular and Coronary Risk Evaluation
www.scorecanada.ca
 - Cardiovascular Age™ www.myhealthcheckup.com
 - Others: see notes



Resistant/Refractory HTN

- Suboptimal therapy
 - Not on diuretic
- Extracellular volume expansion
 - Salt
- Poor compliance
 - Combo pill, HBPM
- Secondary hypertension
 - **Primary hyperaldosteronism**, NSAIDs, EtOH
- **Office or "white coat" hypertension**
- **Pseudo-hypertension**
 - technique



When to think of Secondary HTN

- Extremes of age
- Abrupt worsening
- Refractory to > 3 drugs
- FH of secondary cause
- End organ damage out of proportion to BP
- Clinical clues eg. Pheo, Cushing's, OSA, renal bruit
- Biochemical clues eg. Hypokalemia, creatinine
- Imaging clues eg. adrenal lesion



When to refer to HTN specialist?

- Truly refractory
- Secondary cause of HTN
- Intolerance to many medications
- End organ damage requiring more specialized care



New Messages

- Make correct Dx early & properly/technique
 - AOBP
 - Use of HBPM/ABPM
 - If HTN end-organ damage is present with ok office/home BPs, look for masked HTN
- Lifestyle measures
- Assess overall CV profile “GLOBAL RISK”
 - Lipid Tx, ? ASA
- Patient “buy in” for adherence, Combo pills, once daily forms
- Avoid ACEI & ARB combo for the most part
- Aldosterone antagonists
 - esp LV dysfunction
- If the patient is not at target, ask why?
 - Ask about salt intake, EtOH, adherence, OSA
 - Proper BP technique
 - Home BP monitoring/ABP



Websites

www.hypertension.ca



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