

Home and clinic BP have limited accuracy compared with ambulatory BP for diagnosing hypertension

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One Size Does Not Fit All



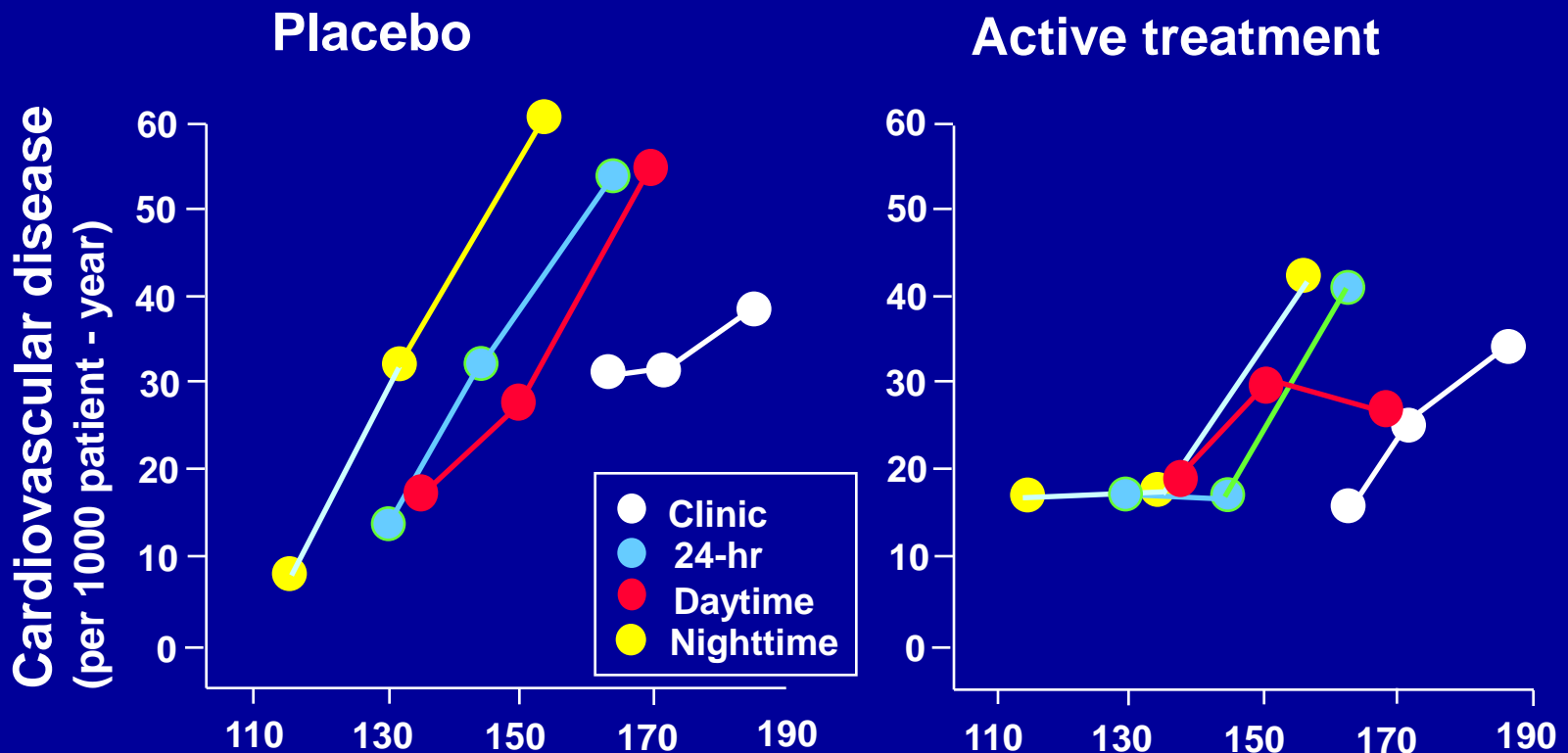
Rationale-

One Size Does Not Fit All

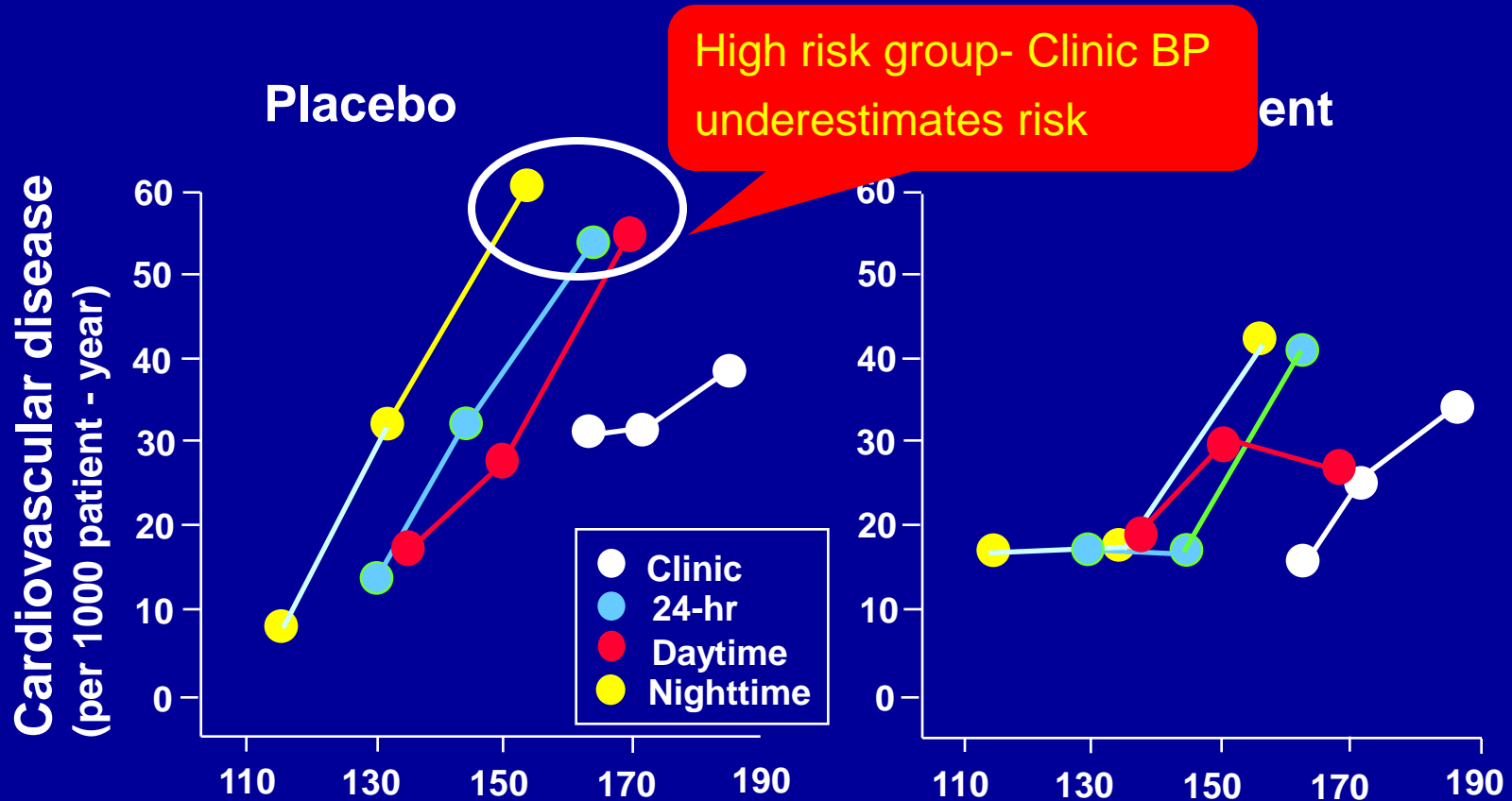
1. Level of risk varies greatly in hypertensive patients
2. Responsiveness to treatment varies greatly in hypertensive patients

⇒ Need tests to improve prediction of risk in individual patients, e.g. ABPM

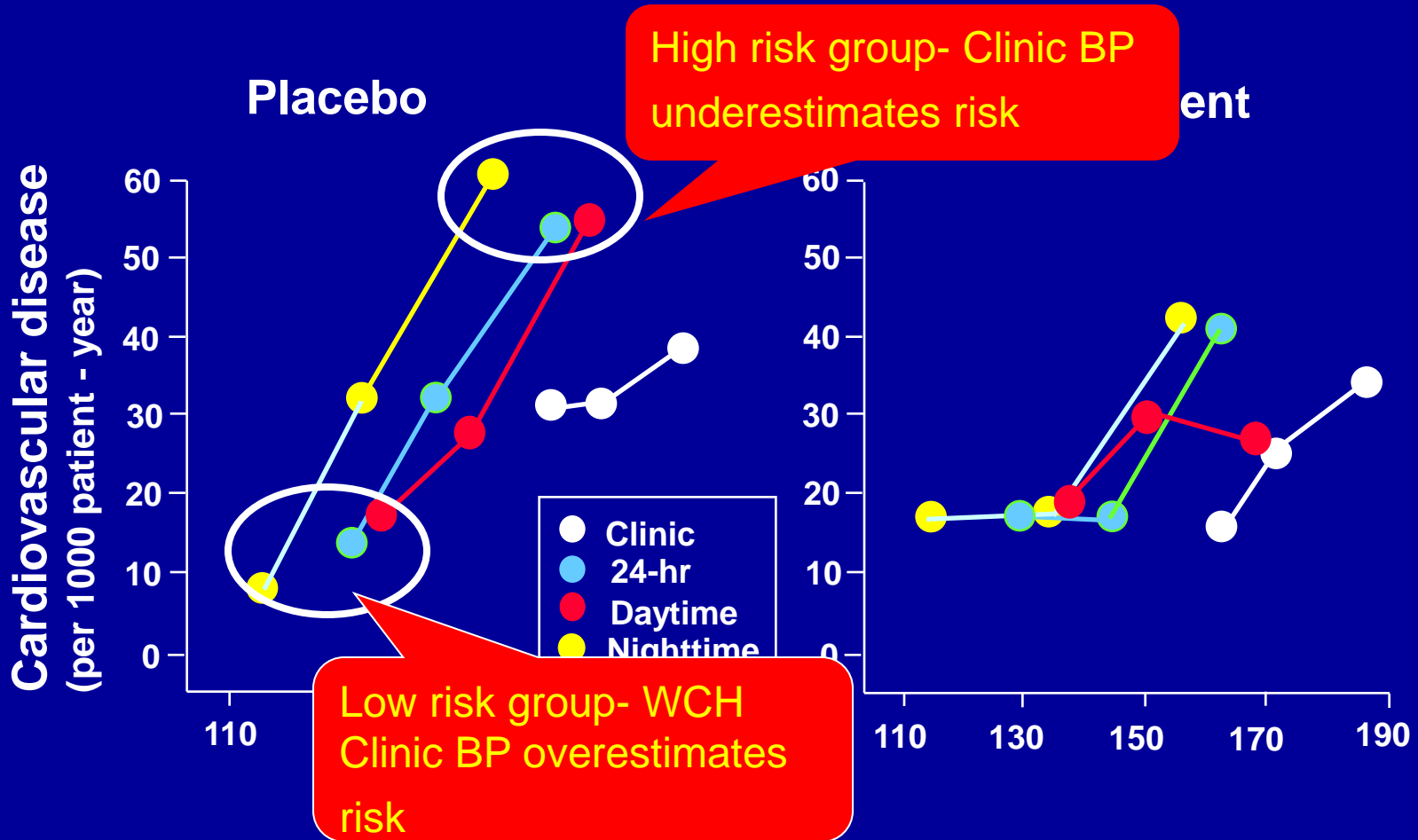
Ambulatory BP and Cardiovascular Disease in the Elderly with Systolic Hypertension: The Syst-Eur Study (N = 808)



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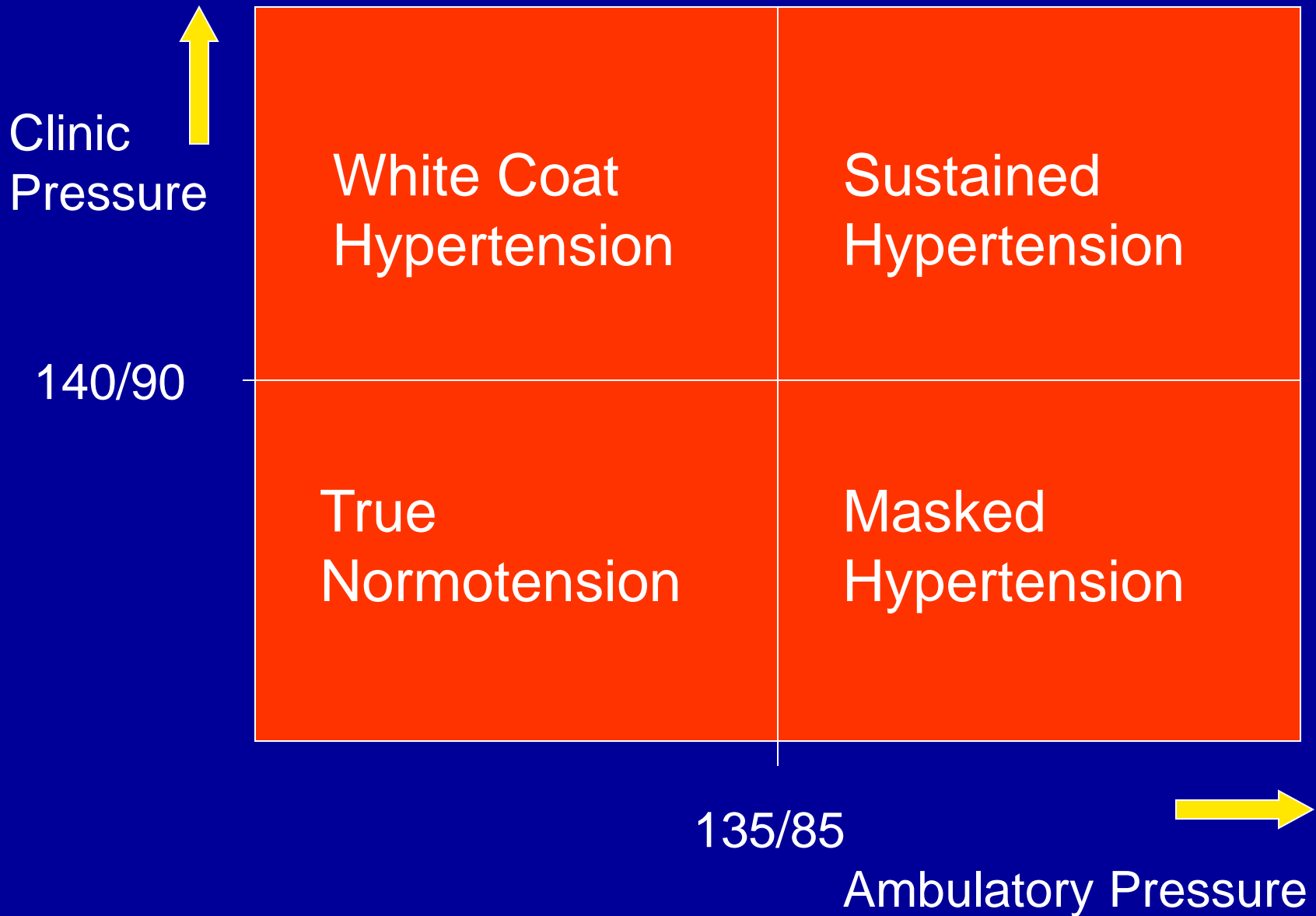
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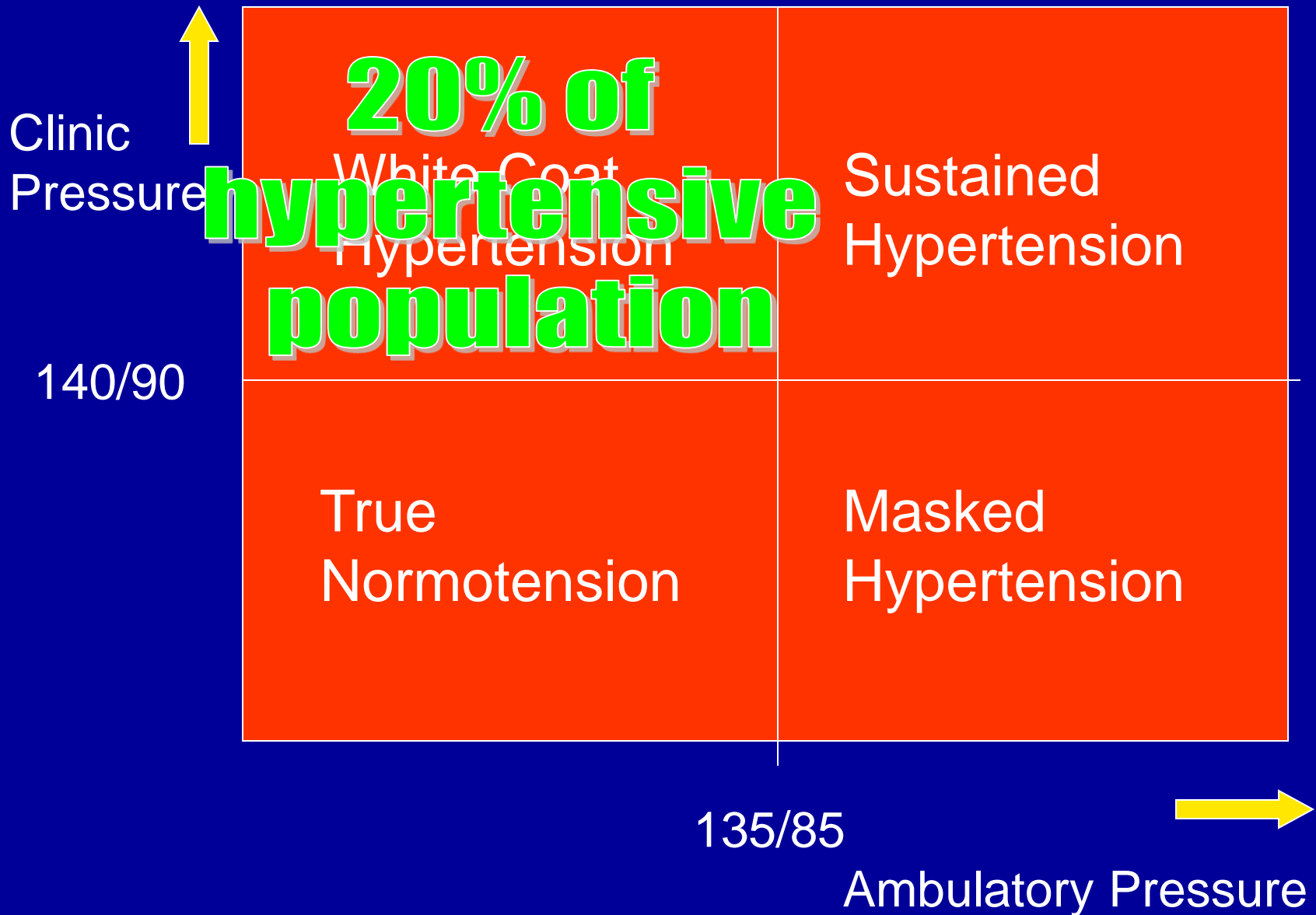


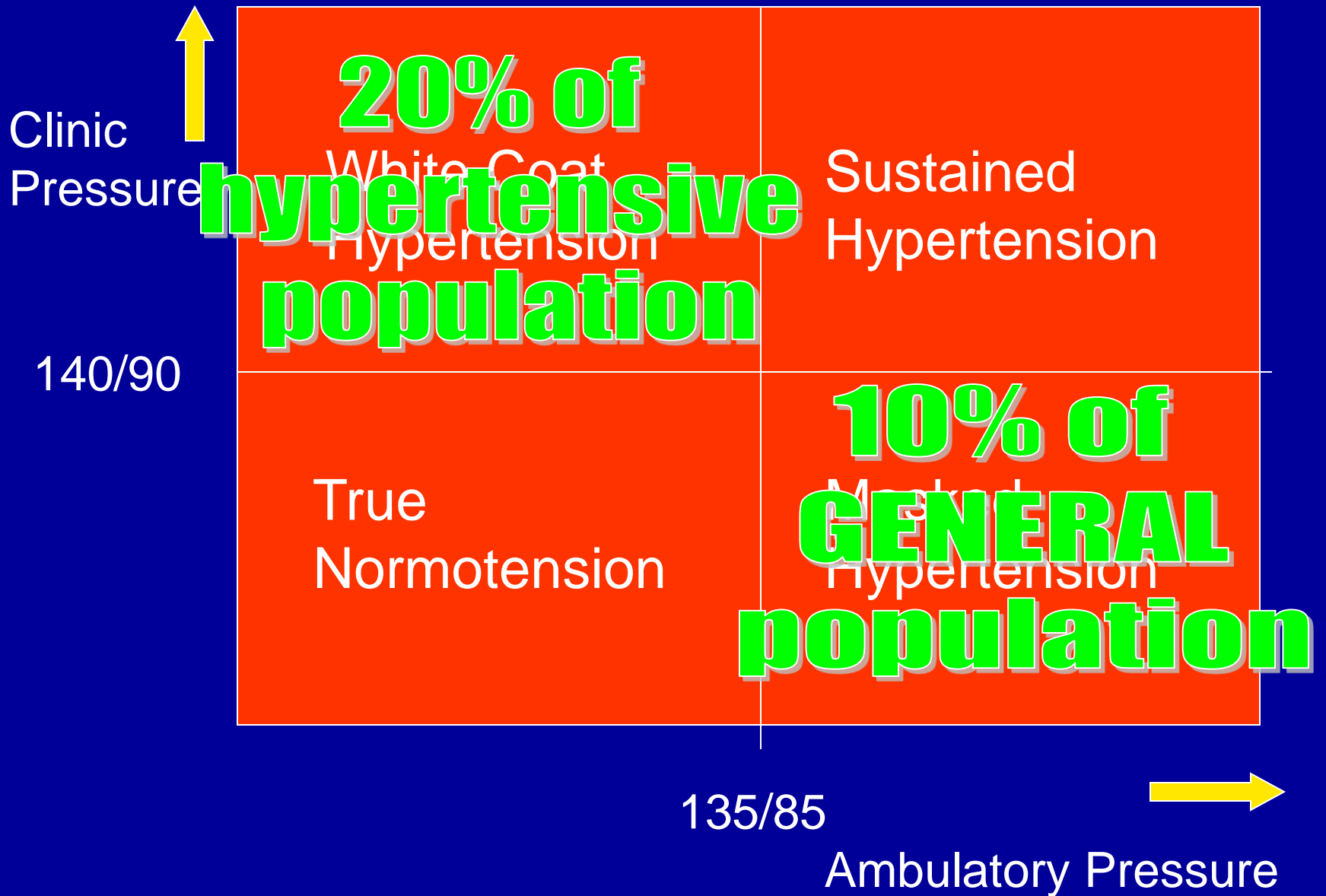
The White Coat Effect in the Real World

- 173 hypertensive patients in 3 general practices in the UK
- Clinic, self-monitoring and ABPM
- White coat effect estimated as difference between other measures of BP and daytime BP:

Physician	19/11 mmHg
Nurse 1	5/8 mmHg
Nurse 2	5/6 mmHg
Self-monitoring in clinic	10/13 mmHg
Self-monitoring at home	5/6 mmHg







Should Ambulatory Blood Pressure Monitoring be a Part of the Routine Evaluation of Hypertensive Patients?

- ABPM is indicated when there is a discrepancy between either successive clinic readings or clinic and home readings

Clinical Indications for ABPM



Clinical Indications for ABPM

T Pickering, Am J Hyperten, 1996, O'Brien, Prague ISH, June 2002

- **Suspected WCH or WCE w/o target organ damage**
- **Evaluation of treatment resistant HTN**
- **Hypotension symptoms on antihypertensive medication**

Clinical Indications (cont)

T Pickering, Am J Hyperten, 1996, O'Brien, Prague ISH, June 2002

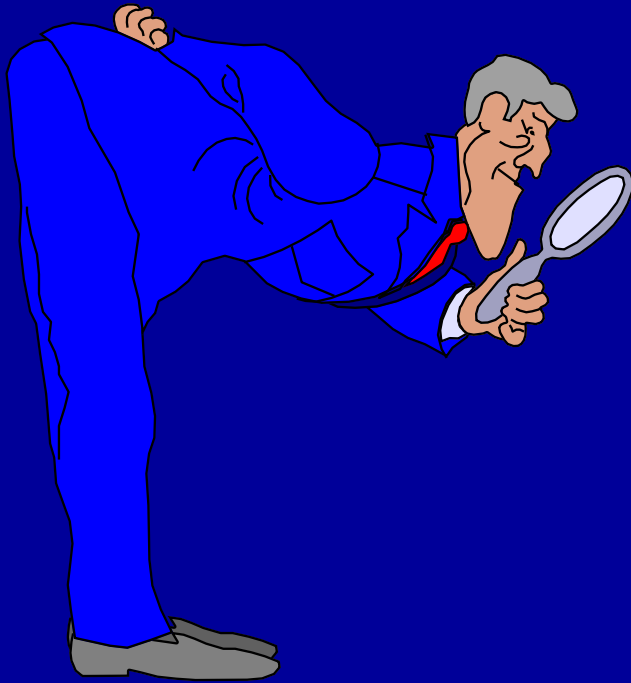
- **Intermittent symptoms possibly related to blood pressure (postural, postprandial)**
- **Nocturnal hypertension (sleep apnea, diabetics)**
- **Autonomic failure: diabetics**

What to assess in an ABPM

Evaluation

- **ABPM readings: quality, pattern.**
- **Periods: total 24 hour, awake, asleep.**
- **24-hour pulse pressure.**
- **White coat HTN or effect.**
- **Heart rate and rate-pressure product.**

What are normal ABPM limits



Are office BP readings
comparable
to ABPM values ?

AHA Recommended standards for normal and abnormal pressures during ABPM.

These pressures are only a guide, and lower pressures may be abnormal in patients whose total risk factor profile is high and in whom there is concomitant disease.

	Normal	Abnormal
Day	135/85	>140/90
Night	120/70	>125/75
24 hour	130/80	>135/85

Prevalence of White Coat Hypertension

Ranges from 10-30% of hypertensive population based on review of clinical trials

Implications of WCE

- **Overestimation of OBP**
- **Potential for overtreatment**
- **Non response to Rx**
- **Complication if masked HTN is not properly treated**
- **Potential Rx adverse effects**

CV Events that are Coincident with Morning Blood Pressure 'Surge'

- Myocardial ischemia
- Myocardial infarction
- Sudden cardiac death
- Stroke
 - u Thrombotic
 - u Hemorrhagic

Case: Gertrude H is a 77 year-old female

<p><u>Past History:</u> Diabetes type 2 for 5 years, HTN, hyperlipidemia. OBP: 160/102 FU OBP: 166/98 (2 weeks)</p>	<p>Physical exam: Unremarkable. BMI: 30. Meds: Ramipril 10, HCTZ 12.5 mg, Metformin 500 tid, Lipitor 20 qhs.</p>
<p>Significant lab: CV Risk Ratio: 5.62 MAU 0.06 mcg/ml HbA1c: .085</p>	<p>24-hr ABPM results: 24 hour abnormal ABP with marked nocturnal hypertension: commonly found in patients with diabetes and loss of glycemic control or in patients with sleep apnea.</p>

RESEARCH

Relative effectiveness of clinic and home blood pressure monitoring compared with ambulatory blood pressure monitoring in diagnosis of hypertension: systematic review

J Hodgkinson *research fellow*¹, J Mant *professor*², U Martin *clinical reader in clinical pharmacology*³, B Guo *research fellow*⁴, F D R Hobbs *professor*¹, J J Deeks *professor*⁴, C Heneghan *reader in evidence based medicine*⁵, N Roberts *information specialist*⁶, R J McManus *professor*¹

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- **Objective**

To determine the relative accuracy of clinic measurements and home blood pressure monitoring compared with ambulatory blood pressure monitoring as a reference standard for the diagnosis of hypertension.

- **Design**

Systematic review with meta-analysis with hierarchical summary receiver operating characteristic models. Methodological quality was appraised, including evidence of validation of blood pressure measurement equipment.

- **Eligibility criteria for selecting studies**

Eligible studies examined diagnosis of hypertension in adults of all ages using home and/or clinic blood pressure measurement compared with those made using ambulatory monitoring that clearly defined thresholds to diagnose hypertension.

- **Results**

The 20 eligible studies used various thresholds for the diagnosis of hypertension.

Compared with ambulatory monitoring thresholds of 135/85 mm Hg,

- Clinic measurements over 140/90 mm Hg had mean sensitivity and specificity of 74.6% (95% confidence interval 60.7% to 84.8%) and 74.6% (47.9% to 90.4%), respectively,

- Whereas home measurements over 135/85 mm Hg had mean sensitivity and specificity of 85.7% (78.0% to 91.0%) and 62.4% (48.0% to 75.0%).

- **Conclusion**

Neither clinic nor home measurement had sufficient sensitivity or specificity to be recommended as a single diagnostic test.

If ambulatory monitoring is taken as the reference standard, then treatment decisions based on clinic or home blood pressure alone might result in substantial over diagnosis.

Ambulatory monitoring before the start of life long drug treatment might lead to more appropriate targeting of treatment, particularly around the diagnostic threshold.

LATEST!!

Hypertension

Implementing NICE guidance

August 2011

NICE clinical guideline 127



Background

High Blood Pressure:

- Major risk factor for stroke, myocardial infarction, heart failure, chronic kidney disease, cognitive decline and premature death.
- Untreated hypertension can cause vascular and renal damage leading to a treatment-resistant state.
- Each 2 mmHg rise in systolic blood pressure associated with increased risk of mortality:
 - 7% from heart disease
 - 10% from stroke.

Definitions

Stage 1 hypertension:

- Clinic blood pressure (BP) is 140/90 mmHg or higher **and**
- ABPM or HBPM average is 135/85 mmHg or higher.

Stage 2 hypertension:

- Clinic BP 160/100 mmHg is or higher **and**
- ABPM or HBPM daytime average is 150/95 mmHg or higher.

Severe hypertension:

- Clinic BP is 180 mmHg or higher **or**
- Clinic diastolic BP is 110 mmHg or higher.

Diagnosis

If the clinic blood pressure is 140/90 mmHg or higher, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension.

Monitoring treatment

For people identified as having a 'white-coat effect' consider ABPM or HBPM as an adjunct to clinic blood pressure measurements to monitor response to treatment.

Aim for ABPM/HBPM target average of:

- below 135/85 mmHg in people aged under 80
- below 145/85 mmHg in people aged 80 and over.

White-coat effect: a discrepancy of more than 20/10 mmHg between clinic and average daytime ABPM or average HBPM blood pressure measurements at the time of diagnosis.

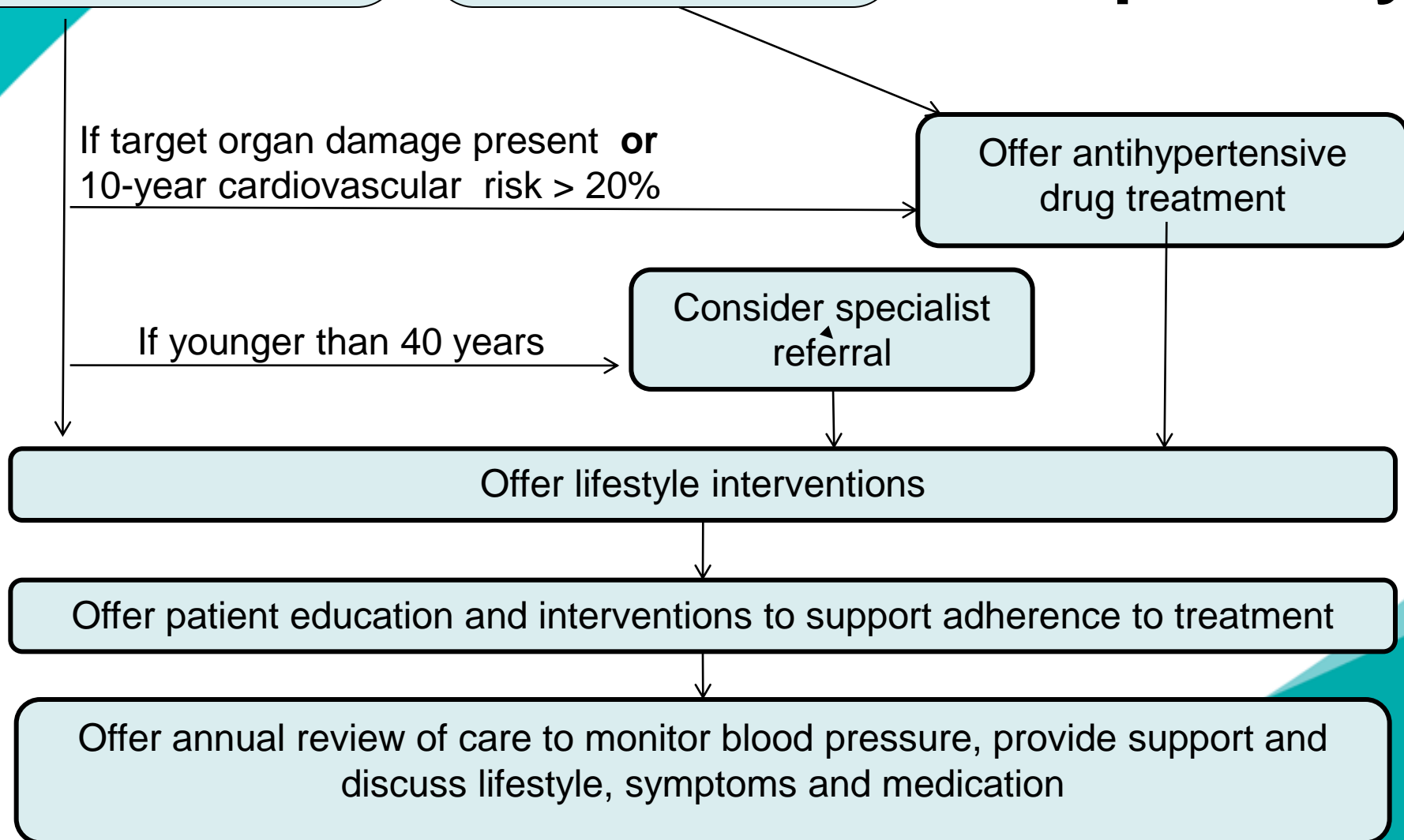
CBPM $\geq 140/90$ mmHg
& ABPM/HBPM
 $\geq 135/85$ mmHg

Stage 1 hypertension

CBPM $\geq 160/100$ mmHg
& ABPM/HBPM
 $\geq 150/95$ mmHg

Stage 2 hypertension

Care pathway



Costs and savings for total population of England

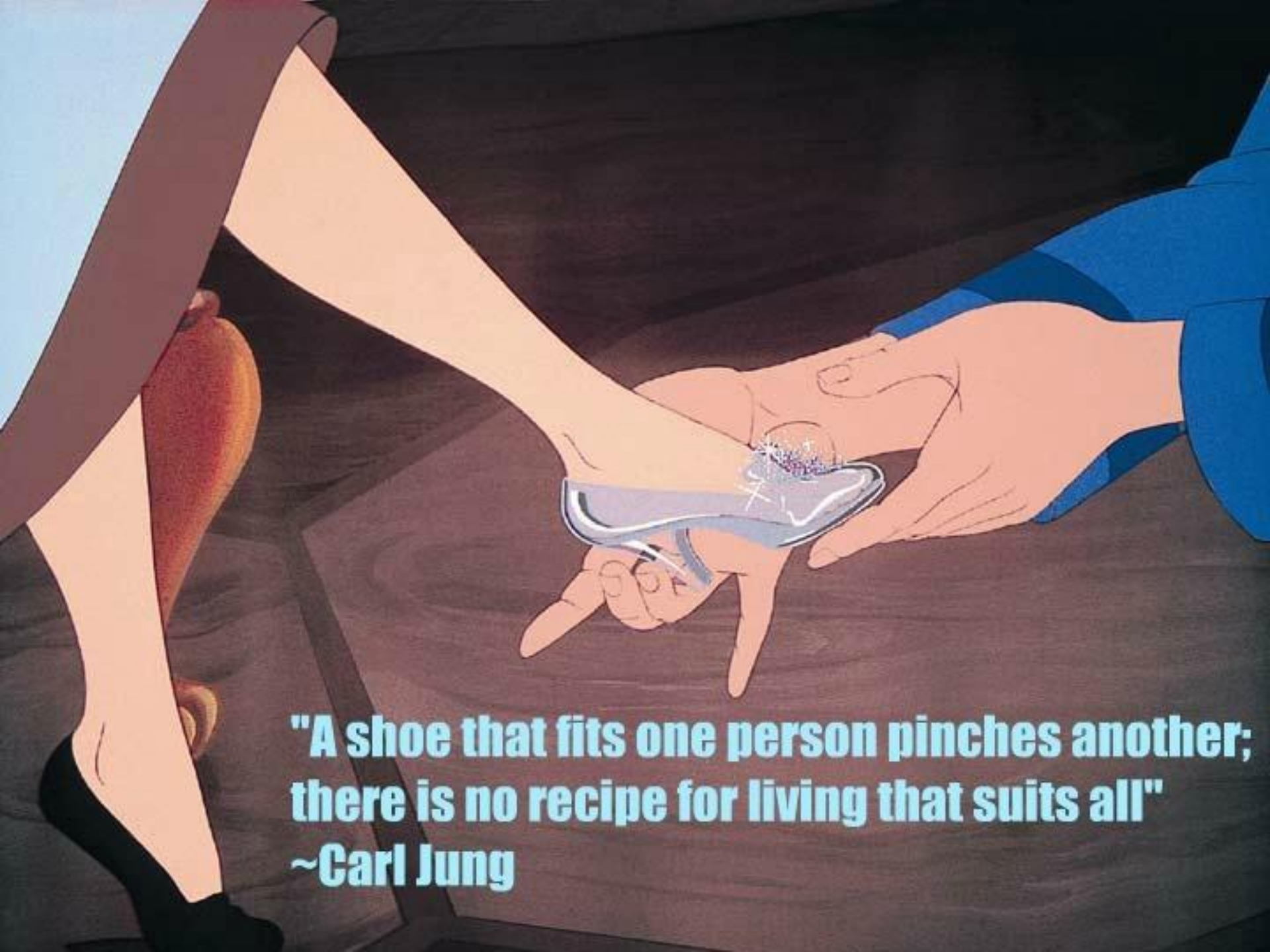
Costs and savings of using ABPM to confirm diagnosis of hypertension

Year	Change in diagnosis cost (£m)	Change in treatment cost (£m)	Net resource impact (£m)
Year 1	£5.1	- £2.5	£2.6
Year 2	£5.1	- £5.8	- £0.7
Year 3	£5.1	- £9.1	- £4.0
Year 4	£5.1	-£12.4	- £7.3
Year 5	£5.1	-£15.7	-£10.5

- In future years, as more people benefit from more accurate diagnoses using ABPM, a cumulative effect of people not receiving antihypertensive drugs inappropriately starts to be seen.
- Savings from reduced treatment costs will start to outweigh the additional costs of diagnoses. Expected savings are £4.0 million in year 3 and £10.5 million in year 5.

Take Home Message

- Home and clinic BP measurement have insufficient sensitivity and specificity compared with ABPM
- But all major morbidity-mortality studies of hypertension have used clinic measurement
- And how CBP translates to ABPM average BP is still unknown
- All major mortality morbidity studies of HTN therapy use CBP
- Therefore until more eligible research available, CBP remains gold standard for us



**"A shoe that fits one person pinches another;
there is no recipe for living that suits all"
~Carl Jung**

Thank You