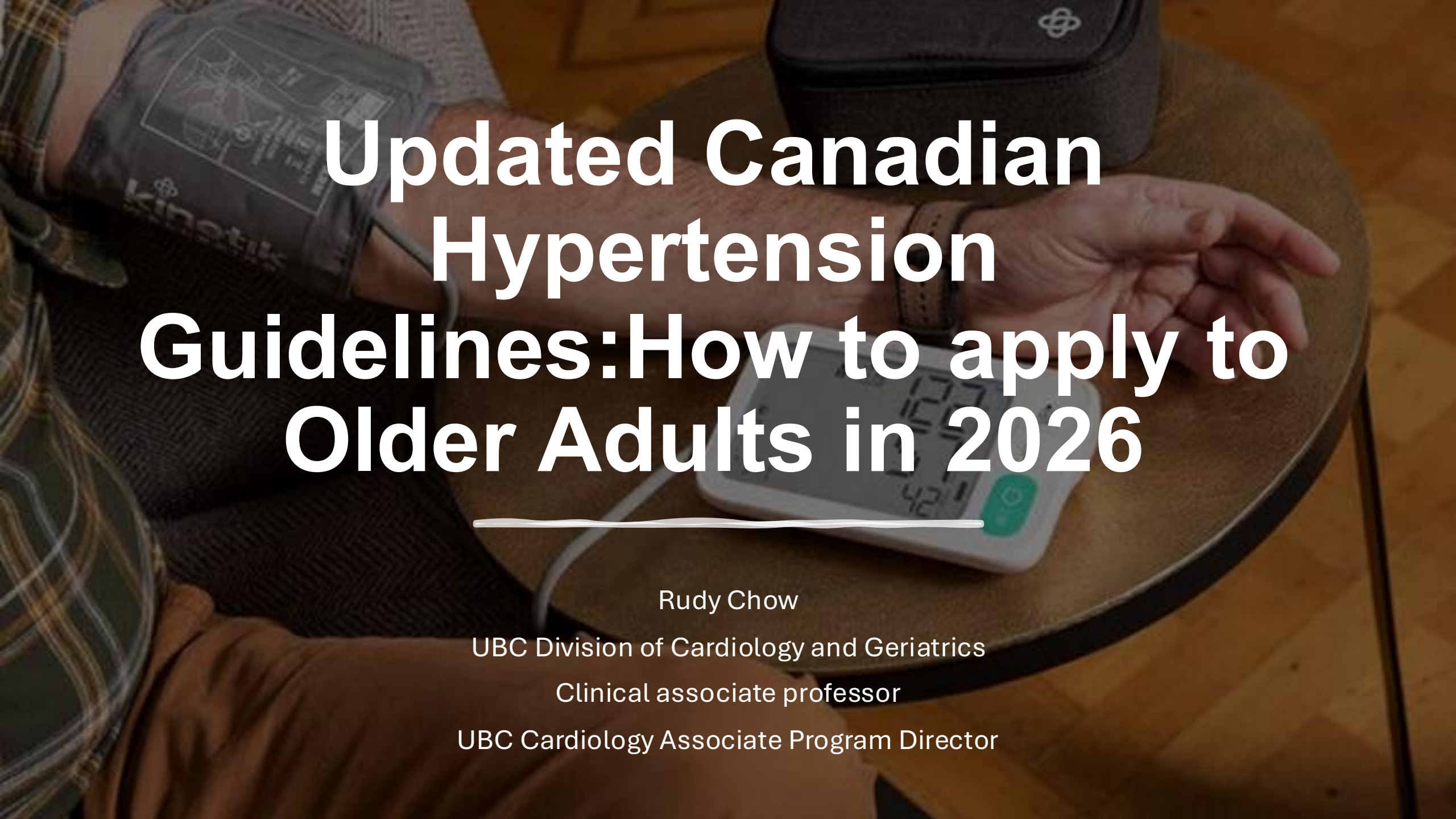


Updated Canadian Hypertension Guidelines:How to apply to Older Adults in 2026

Rudy Chow

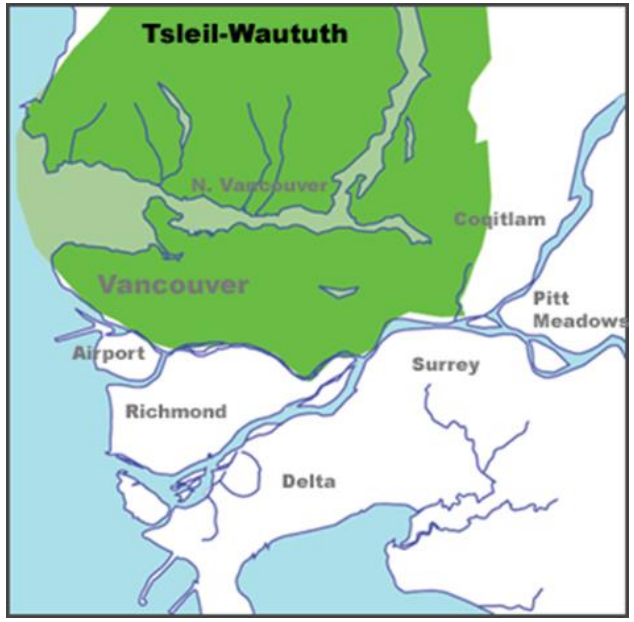
UBC Division of Cardiology and Geriatrics

Clinical associate professor

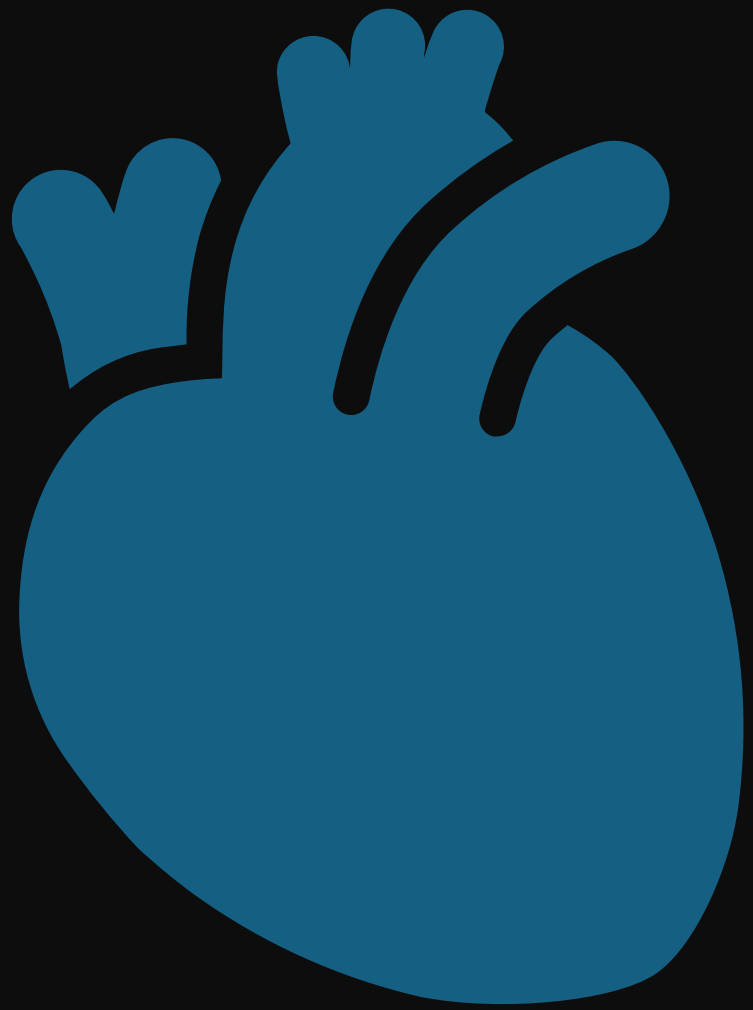
UBC Cardiology Associate Program Director

We would like to acknowledge that we are gathered today on the traditional territories of the Musqueam, Squamish and Tsleil-Waututh peoples.

Source: www.johomaps.net/na/canada/bc/vancouver/firstnations/firstnations.html



I have NO disclosures



Outline

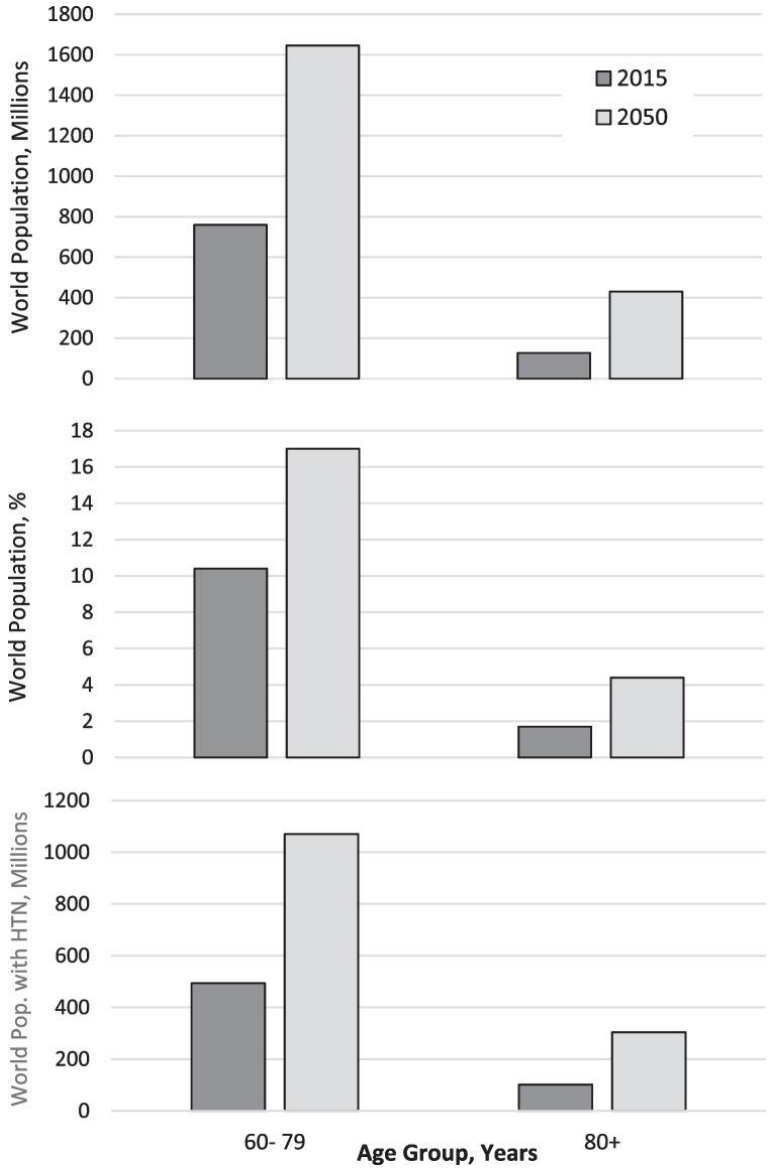
1. Current and projected numbers of older adults with hypertension
2. Diagnosis of Hypertension
3. Landmark hypertension trials
4. Absolute risk for major adverse cardiovascular events and harms in the treatment of older adults
5. Updated Canadian Guideline Recommendations
6. Lifestyle changes in older adults with hypertension
7. Recommendations for pharmacologic management of hypertension in older adults, Canadian and European guidelines

SCOPE of the problem

Population of older adults growing faster than general population globally and prevalent hypertension and CV risk also rise sharply with aging

Health and economic burden of hypertension and related complications will likely grow faster than global population and economy

These factors collectively magnify value of highly scalable, cost-effective management of hypertension in older adults



Impact On the Global Burden of Hypertension and Cardiovascular Disease

- ≥ 80 years projected to grow from 126.6 million in 2015 to 430.3 million in 2050 or from 1.7% to 4.4% of world's population
- 80% of adults ≥ 80 years have hypertension, then ≥ 80 years with hypertension could rise from 101 million in 2015 to 344 million in 2050
- **Number of older adults with hypertension in 2050 would exceed total number of adults 30–79 years with hypertension globally in 2010**

Risk for Major Cardiovascular Events

Death from ischemic heart disease and stroke ~ double each decade from 40–49 through 80–89 years

Risk of fatal ischemic heart disease and stroke double for each 20 mmHg increase in systolic BP above 115 mmHg

Lancet. 2002;14;360(9349):1903–13.

Diagnosis

Blood pressure assessment with **validated automated device** and using **standardized method** recommended

Validated automated oscillometric devices

- **Easier** to use
- Less prone to human error and end-digit preference
- **Better reproducibility**

- In Canada, 90% of BP devices sold at pharmacies validated compared with only 45% of BP devices sold by online retailers

Exceptions:

- Persistent or high burden of arrhythmias
- Children and pregnant people (not validated)

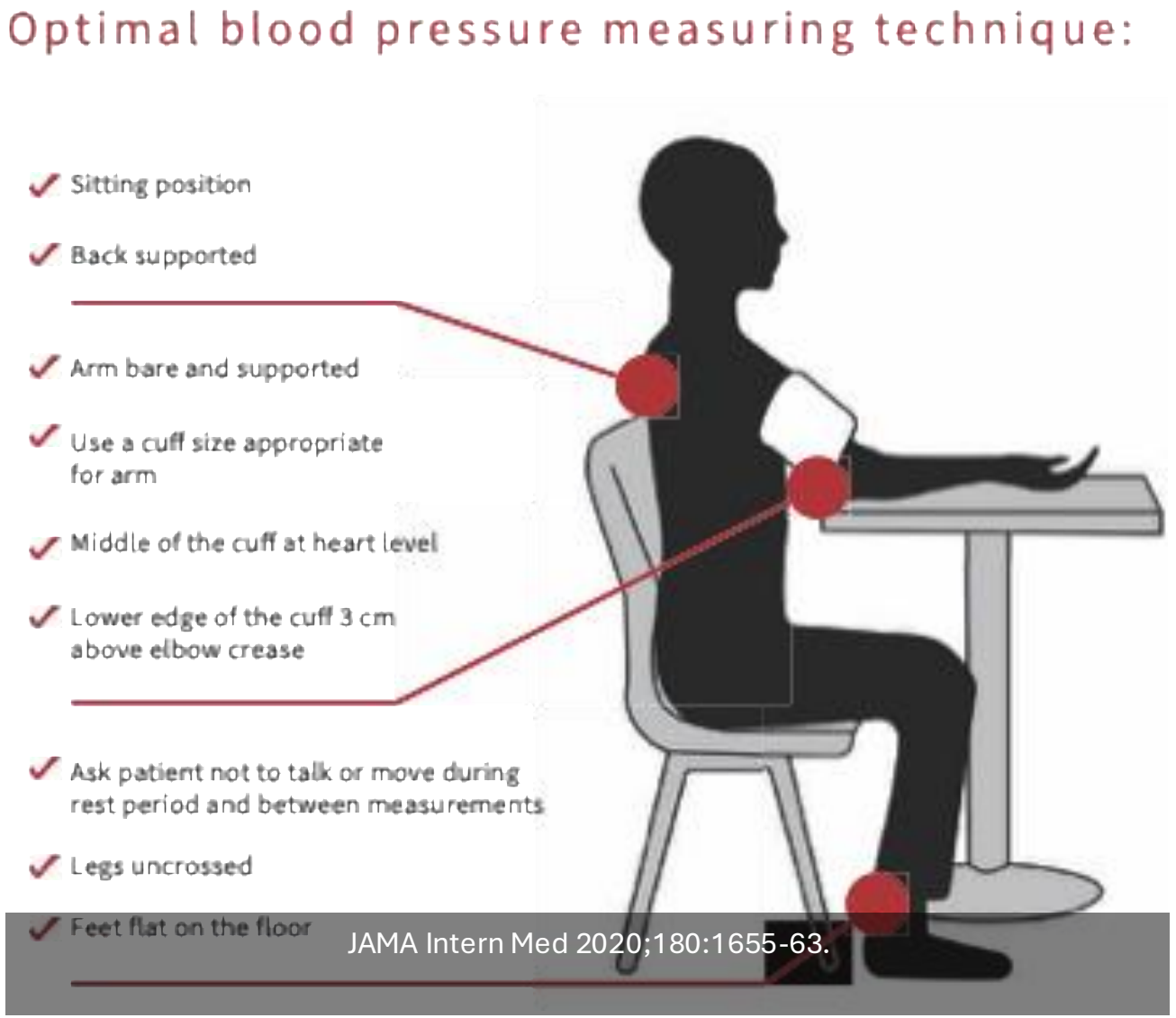
Hypertension CANADA

CJC Open 2024;6:54-6.

Nonstandardized office BP measurements result in readings on average **5–10 mm Hg higher** than standardized measurements

Trial protocols:

- **5-minute** seated rest period
- followed by **3 measurements at 1-minute intervals**



Guideline Recommendation: Out-of-office BP measurements (ABPM or HBPM) useful to confirm the diagnosis of hypertension when office BP elevated

HBPM

- Standard protocol for HBPM involves measuring BP in duplicate twice daily for week

- Out-of-office BP measurements (particularly ABPM) correlate more closely with CV events and death than office BP measurements

Lancet 2023;401:2041-50

?other benefits

Out-of-office BP assessment identify common BP phenotypes

White-coat hypertension (15%–30%)

Masked hypertension (10%–15%)

New Canadian Definition

Definition of hypertension in adults recommended as **BP ≥ 130/80 mm Hg** when measured with validated device under optimal conditions

Hypertension Redefined Rationale

- Prospective study data shown that relative risk for **MACE** for people with BP ≥ 130–139/85–89 mm Hg **1.5-fold to 2.0-fold higher** than for people with BP < 120/80

- Similarly, RCT data on effects of more intensive BP-lowering treatments have consistently shown their effectiveness in reducing risk for MACE for people with BP ≥ 130/80

Curr Hypertens Rep 2013;15:703-16.

Guideline Recommendation:
Pharmacotherapy initiation for hypertension is recommended for adults with **BP ≥ 140/90** mm Hg and for adults with **sBP 130–139 mm Hg at high CV disease risk**

3 major landmark hypertension trials

- **HYVET**: is it worth treating older individuals with hypertension?
- **SPRINT**: is lower really better?
- **STEP**: was SPRINT a fluke?

NEJM. 2008;358:1887–1898.
NEJM. 2015;373:2103–2116.
NEJM 2021;385:1268-1279.

Trial Highlights: HYVET

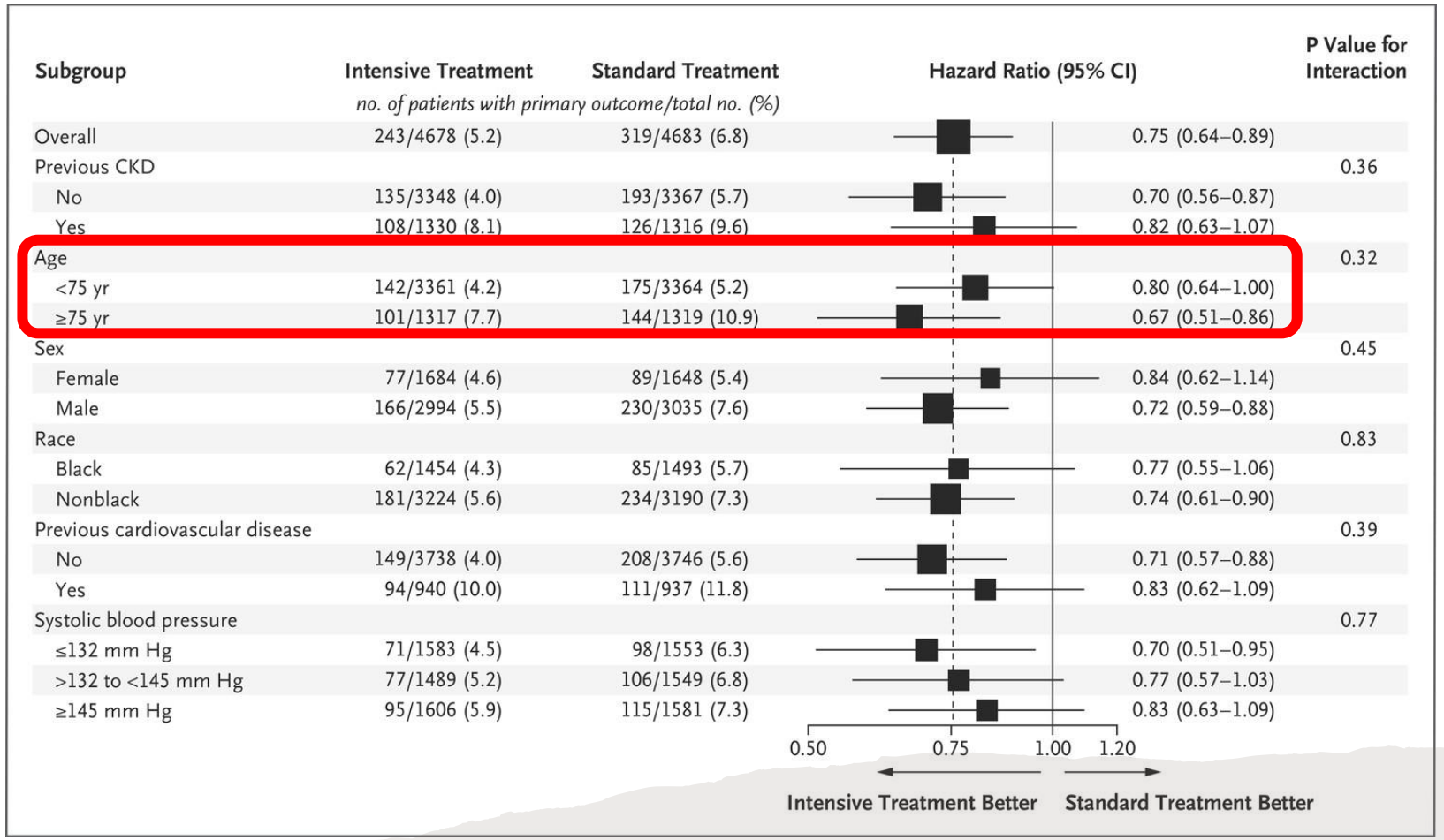
- 3,845 hypertensive patients aged ≥80 years with SBP > 160 mmHg
- Antihypertensive treatment (BP < 150/80 mmHg) 30% ↓ fatal and non-fatal stroke
- Other notable findings:
  - 39% ↓ stroke-related death
  - 23% ↓ all cause death
  - 21% ↓ CV death
  - 64% ↓ heart failure

- CAVEAT: relatively good physical and cognitive status, those **requiring nursing care excluded**

Trial Highlights: SPRINT

- Intensive (<120) vs Standard Treatment (<140)
- 9361 with systolic BP ≥ 130 mm Hg or higher and increased cardiovascular risk
- Intervention stopped early after median follow-up of 3.26 years

- **25% ↓ MI, stroke, heart failure, or death from cardiovascular causes**



Subgroup	Intensive Treatment	Standard Treatment	Hazard Ratio (95% CI)	P Value for Interaction
	no. of patients with primary outcome/total no. (%)			
Overall	243/4678 (5.2)	319/4683 (6.8)	0.75 (0.64–0.89)	
Previous CKD				0.36
No	135/3348 (4.0)	193/3367 (5.7)	0.70 (0.56–0.87)	
Yes	108/1330 (8.1)	126/1316 (9.6)	0.82 (0.63–1.07)	
Age				0.32
<75 yr	142/3361 (4.2)	175/3364 (5.2)	0.80 (0.64–1.00)	
≥75 yr	101/1317 (7.7)	144/1319 (10.9)	0.67 (0.51–0.86)	
Sex				0.45
Female	77/1684 (4.6)	89/1648 (5.4)	0.84 (0.62–1.14)	
Male	166/2994 (5.5)	230/3035 (7.6)	0.72 (0.59–0.88)	
Race				0.83
Black	62/1454 (4.3)	85/1493 (5.7)	0.77 (0.55–1.06)	
Nonblack	181/3224 (5.6)	234/3190 (7.3)	0.74 (0.61–0.90)	
Previous cardiovascular disease				0.39
No	149/3738 (4.0)	208/3746 (5.6)	0.71 (0.57–0.88)	
Yes	94/940 (10.0)	111/937 (11.8)	0.83 (0.62–1.09)	
Systolic blood pressure				0.77
≤132 mm Hg	71/1583 (4.5)	98/1553 (6.3)	0.70 (0.51–0.95)	
>132 to <145 mm Hg	77/1489 (5.2)	106/1549 (6.8)	0.77 (0.57–1.03)	
≥145 mm Hg	95/1606 (5.9)	115/1581 (7.3)	0.83 (0.63–1.09)	

Trial highlights: STEP

- Multicenter, RCT of 8511 **Chinese** patients age **60 to 80** yr with hypertension
- Intensive (110-130) vs standard (130-150)
- **26% ↓ stroke, ACS, ADHF, coronary revascularization, atrial fibrillation, or CV death**

SUBSEQUENT BP trials 2024:

- ESPRIT trial (included diabetics [39%] and stroke [27%]): 12% ↓ in MACE
- BP road trial: (DM2): 21% ↓ in MACE

N Engl J Med. 2024 Nov 16. doi: 10.1056/NEJMoa2412006.
Lancet 2024; 404: 245–55

Estimated Benefit of Antihypertensive Therapy for Reducing MACE based on Age

<80 year olds

STEP 60– ≤ 80 years and SPRINT 50 – < 80 years

Study	Design	Intervention	Control	In-study SBP Group Difference	Primary Outcome	[b]Primary Outcome NNT at ~ 3.6 years
STEP [10••]	Prospective	SBP 110 – < 130	SBP 130 – < 150	135.9 vs 126.7	Stroke, ACS, MI, CHF, A-fib, CV death	86 vs. standard Rx
60–80 years	Randomized	Intensive	Standard	9.2 mmHg over intervention		
[a]**SPRINT** [7, 9•]	Randomized open-label	SBP < 120	SBP 135 – < 140	134.5 vs. 121.1	MI, ACS, stroke, CHF, CV death	45 vs. standard Rx
50–79 years		Intensive	Standard	13.4 mmHg over intervention		

>80 years

HYVET and SPRINT 80 years and older

Study	Design	Intervention	Control	In-study SBP Group Difference	Primary Outcome	Primary Outcome NNT at ~ 3.6 years
HYVET [6]	Randomized, double-blind, placebo-control	BP target 150/80	BP ≤ 220/ ≤ 110 (upper limit)	158.5 vs 143.5 Δ 15 mmHg at 2 years	Fatal, non-fatal stroke	36 vs. placebo
SPRINT [9•]	Randomized to BP target (open-label treatment)	SBP target < 120 intensive	SBP target vs 135–139 standard	135.3 vs 123.9 Δ 11.5 mmHg over intervention	MI, ACS, stroke, CHF, CV death	20 vs. standard Rx
SPRINT [9•] **(MoCA)**	MOCA ≥ vs. < ~ 25 percentile	SBP target < 120 intensive	SBP target 135– 139 standard	135.3 vs 123.9 Δ 11.5 mmHg over intervention	MI, ACS, stroke, CHF, CV death	13 vs. standard Rx

SHEP guidelines

*** Hypertension Canada *High-Risk* Patient**

Individuals ≥50y **AND** with SBP 130-180 mmHg **AND** with one or more of the following CV risk factors should be considered for intensive BP 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/1.73m²)

OR

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

OR

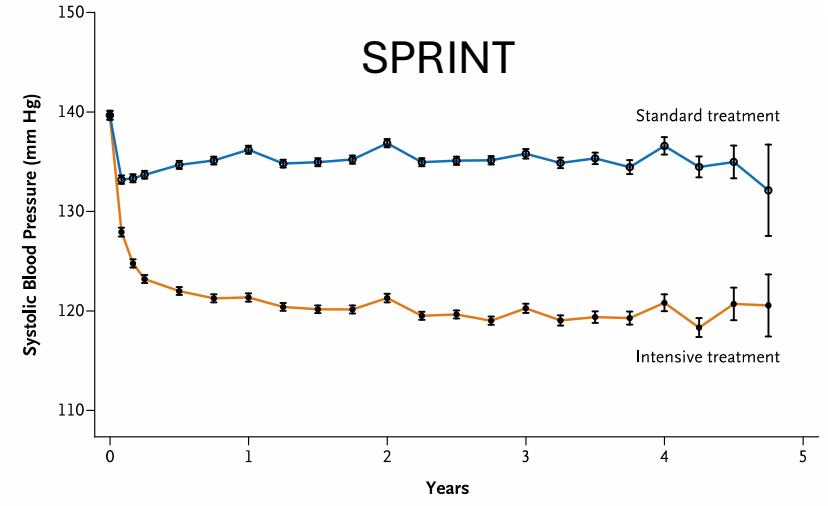
- ✓ Age ≥75 years

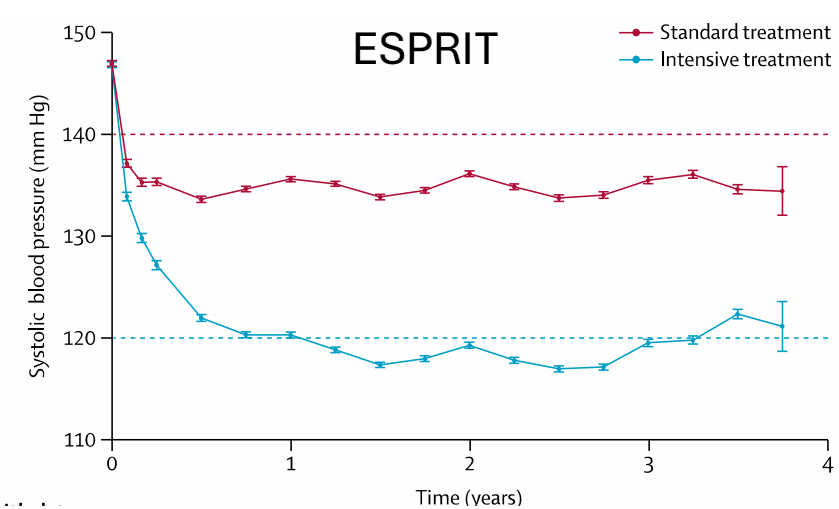
Four variable Modification of Diet in Renal Disease (MDRD) equation

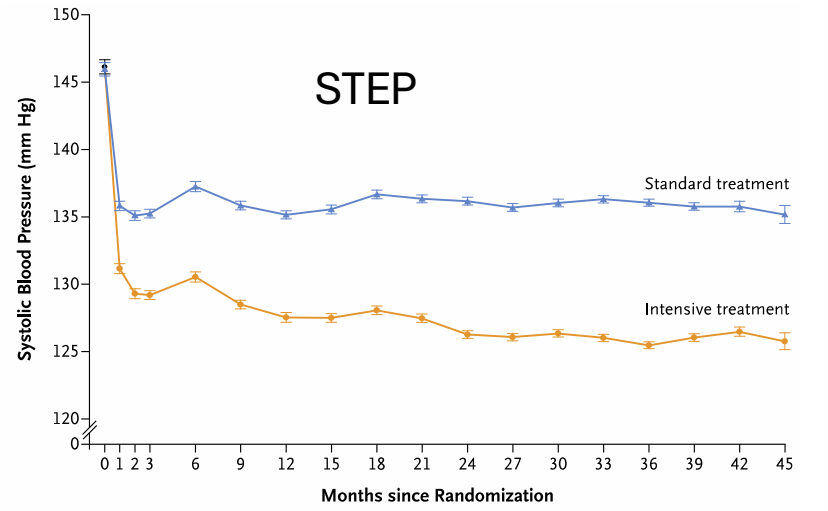
± Framingham Risk Score

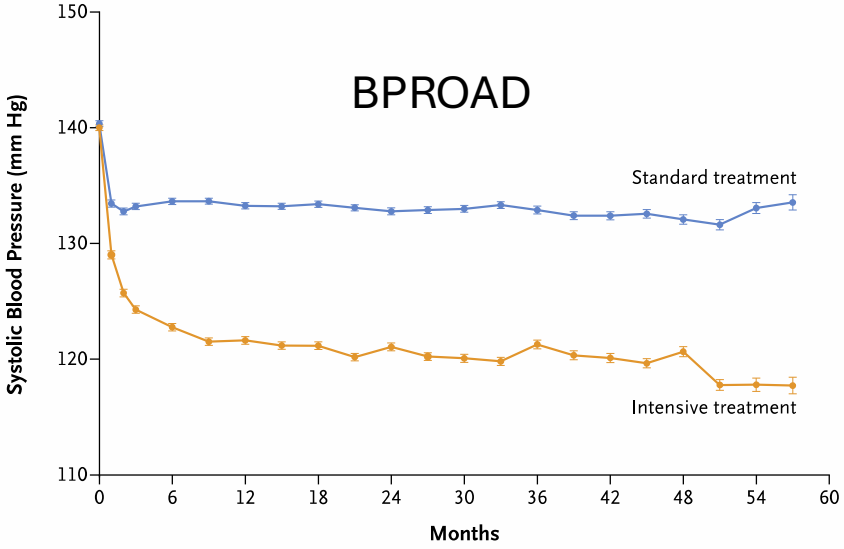
Patient population	BP threshold for initiation of antihypertensive therapy		BP treatment target	
	SBP mmHg	DBP mmHg	SBP mmHg	DBP mmHg
Hypertension Canada High-Risk Patient*	≥ 130	N/A	< 120	N/A
Diabetes mellitus**	≥ 130	≥ 80	< 130	< 80
Moderate-to-high Risk (TOD or CV risk factors)**	≥ 140	≥ 90	< 140	< 90
Low Risk (No TOD or CV risk factors)**	≥ 160	≥ 100	< 140	< 90

Is Targeting <120 mmHg too low?









Rather than recommending more intensive BP target of systolic BP < 120 mm Hg

Recommend more conservative sBP target of < 130 mm Hg

- Research-quality BP measures generally 5–10 mm Hg lower than BP measures in routine clinical care setting
- Most participants in large RCTs targeting systolic BP < 120 mm Hg did NOT achieve this target

Do NOT recommend specific diastolic BP target

- Evidence that adults with **sBP < 130 mm Hg at relatively low CV risk** even when dBP is 70–90 mm Hg

Circulation 2018;137:134-43.

Guideline Recommendation: Treatment, including healthy lifestyle changes +/- pharmacotherapy, recommended for adults with hypertension to achieve target **sBP < 130 mm Hg**, provided treatment well tolerated

Nuances with Clinical Trials

Clinical trials enrolled **independent** older adults and **free from life limiting** health conditions

Study subjects did NOT have major **mental or physical limitations** or clinically significant **orthostatic hypotension**

Not all adults attain standard or intensive therapy goals when indicated

Risks from intensive antihypertensive therapy, quantifiable as **number-needed-to-harm**

Rx Group	All (9361) / Events	≥ 80 years (1167) / Events	≥ 80 years (MoCA+ [754][b]	< 80 years (8194)
Intensive	15.1% (707/ 4678)	34.1% (200/ 586)	32.3% (122/ 378)	12.4% (507/ 4092)
Standard	11.1% (519/ 4683)	28.6% (166/ 581)	26.9% (101/ 376)	8.6% (353/ 4102)
NNH	25	18	19	27

Number Needed to Harm With Intensive vs. Standard Treatment Goals - SPRINT

Table 3. Serious Adverse Events, Conditions of Interest, and Monitored Clinical Events.

Variable	Intensive Treatment (N=4678)	Standard Treatment (N=4683)	Hazard Ratio	P Value
	no. of patients (%)			
Serious adverse event*	1793 (38.3)	1736 (37.1)	1.04	0.25
Conditions of interest				
Serious adverse event only				
Hypotension	110 (2.4)	66 (1.4)	1.67	0.001
Syncope	107 (2.3)	80 (1.7)	1.33	0.05
Bradycardia	87 (1.9)	73 (1.6)	1.19	0.28
Electrolyte abnormality	144 (3.1)	107 (2.3)	1.35	0.02
Injurious fall†	105 (2.2)	110 (2.3)	0.95	0.71
Acute kidney injury or acute renal failure‡	193 (4.1)	117 (2.5)	1.66	<0.001

Low incidence of treatment-related adverse events: ESPRIT trial

- Hypotension and syncope rates in intensive group were 0·1% (7/ 5624) and 0·4% (24/5624)
- Substantially lower than in SPRINT despite similar levels of BP reduction
- ?**Careful drug uptitration** and **patient monitoring** in ESPRIT might have led to avoidance of side-effects

- **KEY POINT: Safety profile challenges notion that adverse events inevitable consequence of intensive BP control**

Very old age (≥85 years), frailty, multimorbidity, and polypharmacy

Estimated prevalence of frailty in people aged >65 years is 7%–16% and greater in women than in men

Although the main determinant of frailty = age, chronological age must be differentiated from biological age

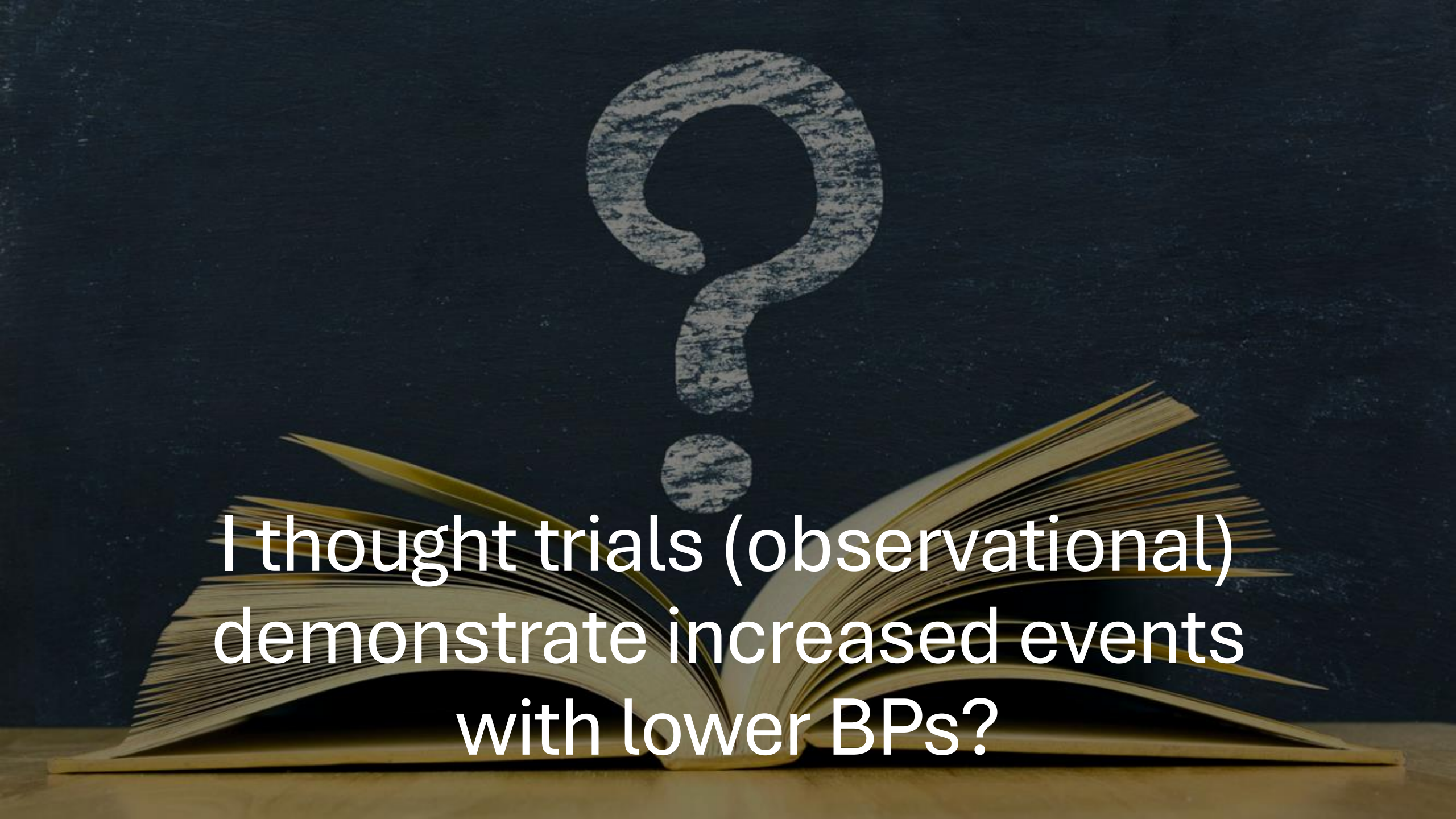
J Gerontol A Biol Sci Med Sci 2001;56:M146–156.

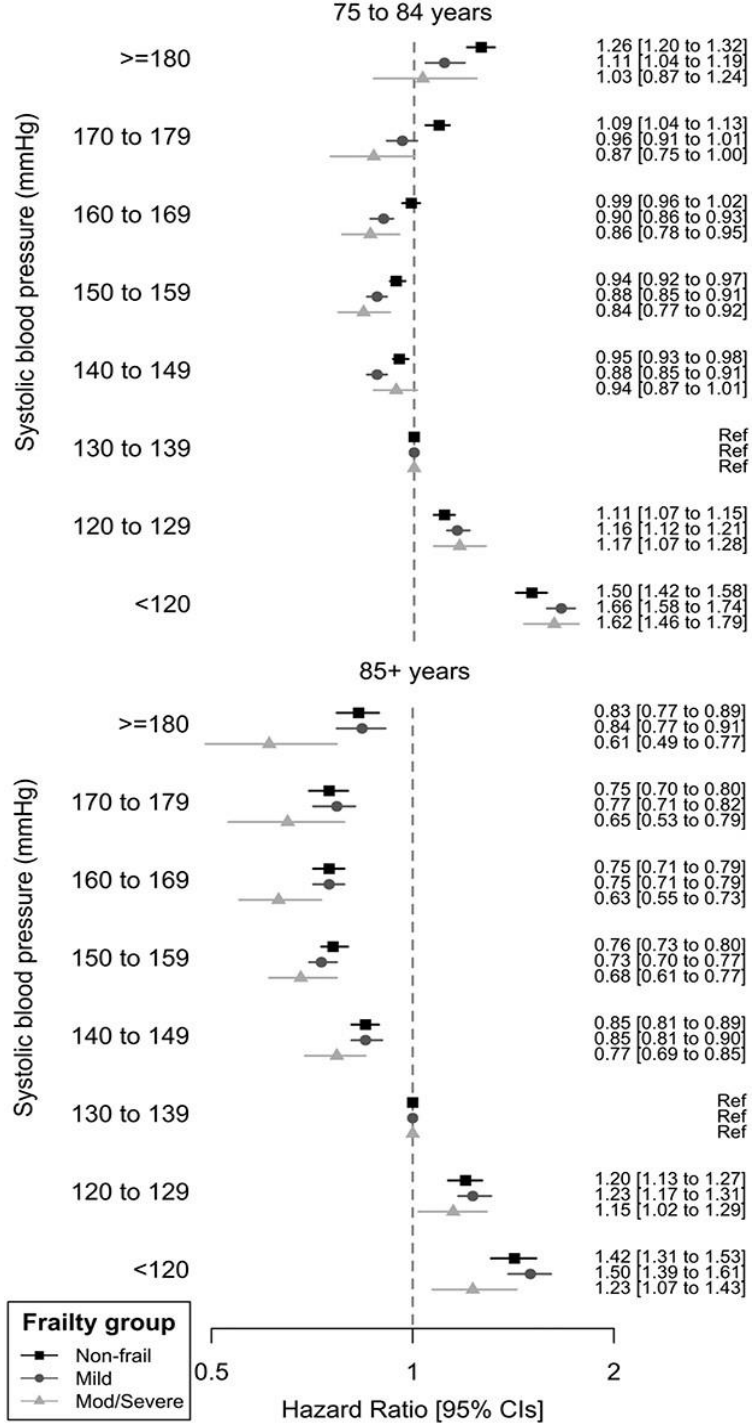
Issues with Older Adults

Using multiple drugs may have more unpredictable effects on BP in older patients

- Increased competition for underlying mechanisms responsible for their degradation and elimination
- Ability of baroreceptors and chemoreceptors-reflex systems in maintaining steady treated BP level can decline with ageing

Am J Physiol Regul Integr Comp Physiol 2007;293:R3–r12.
Clin Auton Res 2014;24:285–96.


I thought trials (observational) demonstrate increased events with lower BPs?



Observational study of 415 980 people aged >75 years

36-item electronic frailty index to include severely frail patients

Lowest mortality risk observed at sBP of 140–160 mmHg and dBP of 80–90 mmHg

sBP of <130 mmHg or diastolic BP of <80 mmHg associated with excess mortality

Age Ageing 2020;49:807–13. https://doi.org/10.1093/ageing/afaa028

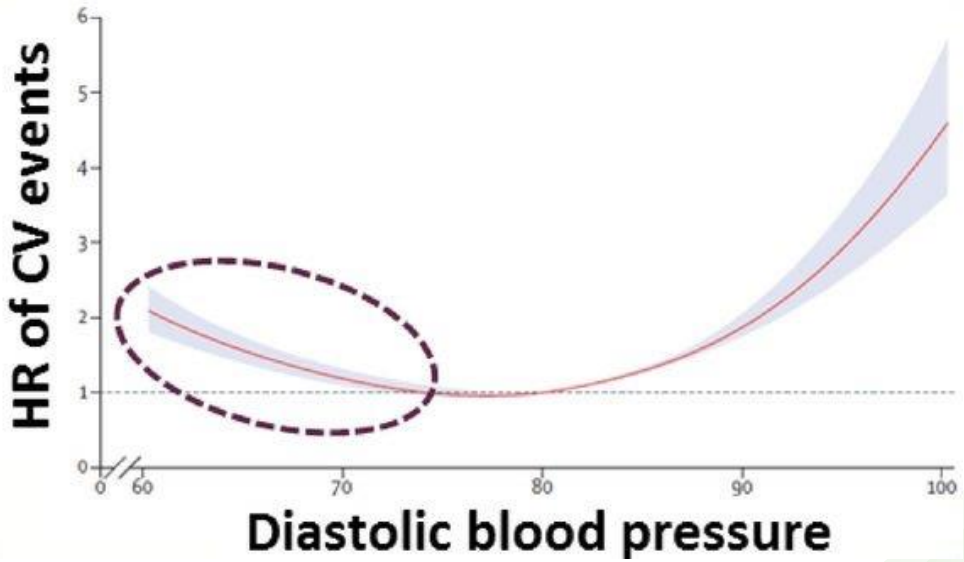
Issues with interpretating **observational** frailty literature

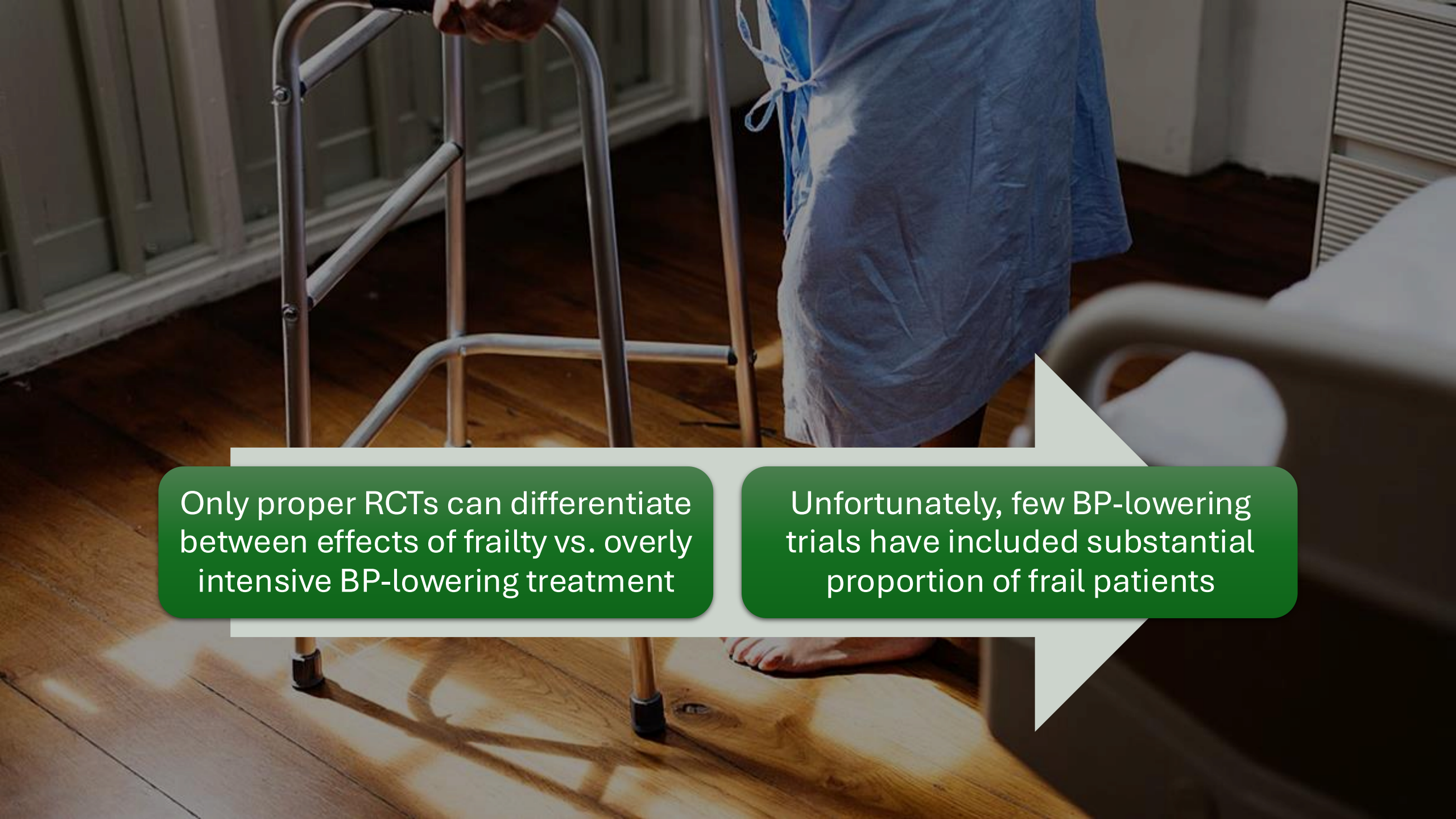
- Frailty on its own = strong predictor of mortality and CV complications
- Frailty accompanied by decrease in sBP
- Unidentified biases potentially present
- **Stiffness of large arteries associated with both low dBP** and increased mortality

J shaped Curve

- BP J-curve evident in observational datasets highly unlikely to reflect causal process
- Attributed to **residual confounding** and/or **reverse causation**

- Currently available evidence from RCTs NOT demonstrated weakening of benefits of BP-lowering treatment among frailer patients enrolled in these trials




Only proper RCTs can differentiate between effects of frailty vs. overly intensive BP-lowering treatment
Unfortunately, few BP-lowering trials have included substantial proportion of frail patients

RCTs of BP lowering in frail older patients

Few adults aged ≥85 years have been included in trials

Generalizing data from RCTs to very frail patients may not be possible

RCTs typically excluded those in residential care

Participants likely had **no more than MILD frailty**

From the totality and consistency of recent large trials….

- Very old and frail patients with hypertension should NOT be denied potential benefits of BP-lowering treatment down to target of 120–129/70–79 mmHg
- Personalized decision-making should be priority in very old and frail
- Major consideration should also be whether reversible causes of frailty can be addressed
  - Treating underlying comorbidities
  - Undergoing supervised muscle-strengthening physiotherapy or supervised exercise and co-ordination and balance training

Guideline Recommendation: **Low-dose combination therapy** (ideally as single-pill combination) recommended as initial treatment

Recommend upfront combo therapy (ideally as single -pill combo) with an ACEI or ARB plus either thiazide or thiazide-like diuretic or dihydropyridine CCB

~70% of adults with HTN will require more than 1 class of medication to achieve BP control

Proportion projected to increase as BP targets are lowered

Combining lower doses of different classes provides additive BP-lowering effects while minimizing adverse effects

Circulation 2012;126:2105-14.

Benefits of Single Pill Combinations

Reduce	Reduce mean sBP by 4.0 mm Hg beyond that achieved by free-equivalent combination therapy
Achieve	Achieve BP control in ~ 1/3 more patients than with standard monotherapy (65% vs 48%)
Compliance	Significantly better drug adherence and possible trend toward better drug persistence
Savings	Yield substantial cost savings • 2009 Canadian study estimating yearly cost savings of $27–45 million

Hypertension 2021;77:692-705.
J Hypertens 2019;37:1768-74.
Hypertension 2010;55:399-407.
Can J Clin Pharmacol 2009;16:e151-5.

Can J Clin Pharmacol 2009;16:e151-5.
J Hypertens 2019;37:1768-74.

Potential Harms?

No difference in withdrawal from adverse events

Higher incidence of **dizziness**

Single-pill combination agents often available at lower cost than their individual components

- Lisinopril Hctz, 10 mg-12.5 mg ($0.22-0.28)
- Irbesartan Hctz 150 mg-12.5 mg ($0.25-0.30)
- Candesartan Hct, 16 mg-12.5 mg ($0.24-0.25)
- Losartan-hct, 50 mg-12.5 mg ($0.27)

- Lisinopril 10 mg ($0.18-0.19)
- Irbesartan 150 mg ($0.25-0.27)
- Candesartan 16 mg ($0.25-0.27)
- Losartan 50 mg ($0.26-0.32)
- HCTZ 12.5 mg ($0.01-0.02)

Starting blood pressure-lowering treatment in very old or frail patients

Desired Regimen

01

Treatment can be started with a long-acting **dihydropyridine calcium channel antagonist**

02

To achieve BP control, ACE inhibitor or ARB can also be used

03

Thereafter, low-dose thiazides or thiazide-like diuretics preferred

- Unless specific CI, i.e gout, orthostatic hypotension, or disturbed micturition

Circ Res 2019;124:1045–60.
Curr Hypertens Rep 2022;24:571–80.

Less Desired Agents

- **Beta-blockers**: reduce HR, cause fatigue, and increase systolic pulse wave amplitude, which is insufficiently buffered in stiff central elastic arteries

- **Vasodilating beta-blockers, direct vasodilators** (e.g. hydralazine and minoxidil), **alpha-1 blockers** associated with increased risk of **orthostasis**

J Clin Hypertens (Greenwich) 2022;24:1180–6.

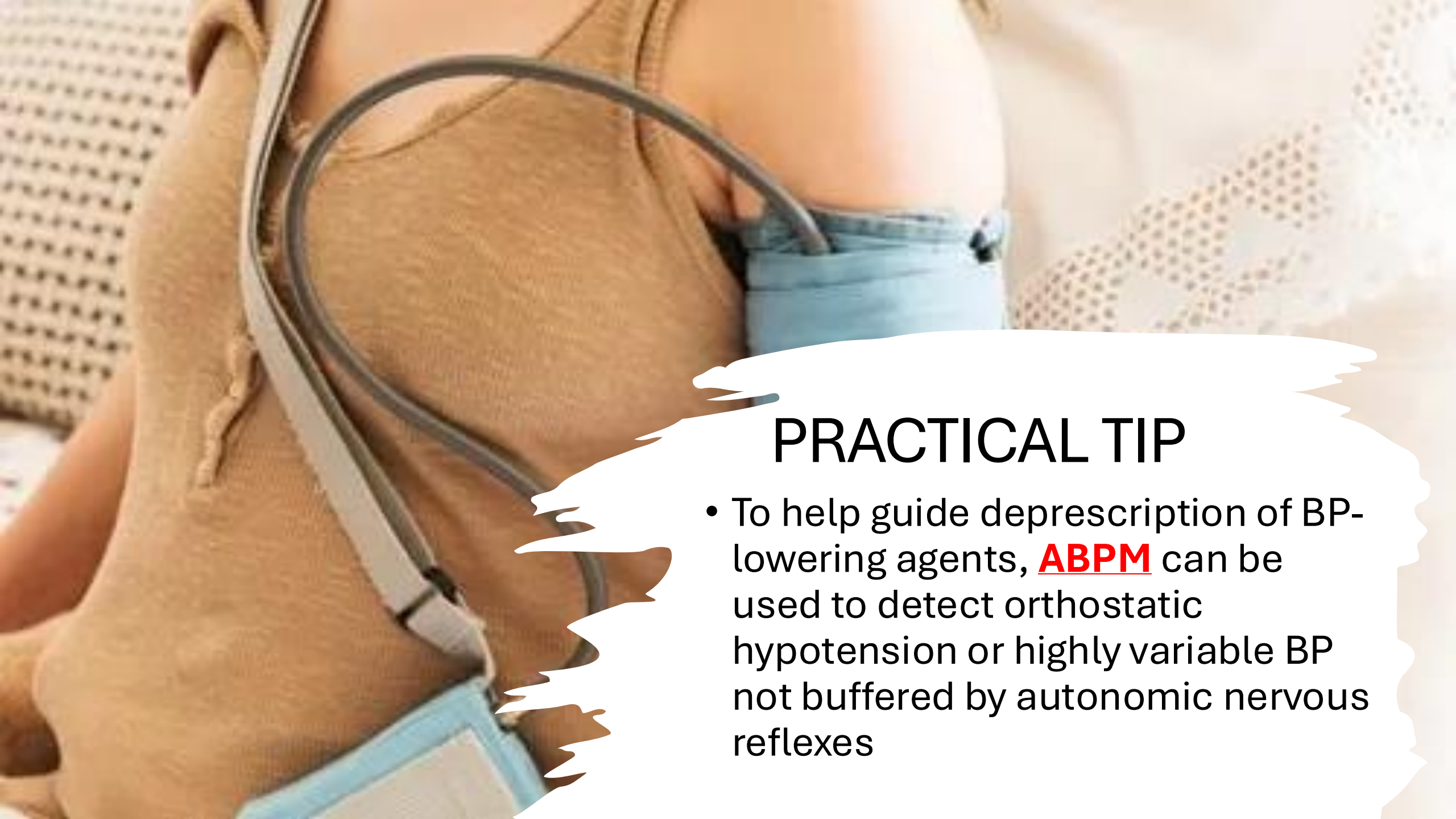
PRACTICAL TIPS

- Once appropriate combination found, combination tablet with variable composition of two agents may optimize adherence

- **Starting with combination therapy NOT advised** in most very old and/or frail patients, unless BP very high

Maintaining blood pressure lowering in very old or frail patients

- IF old/ frail patients tolerate BP-lowering treatment well→ **NO AUTOMATIC need to deprescribe or discontinue treatment**
- Should be kept under review
- Progressive frailty→ sBP tends to drop→ deprescription of BP-lowering drug might become necessary
- Candidate drugs for deprescribing→ identify BP-lowering drugs that may have become CI due to concomitant RX or newly developed comorbidities



PRACTICAL TIP

- To help guide deprescription of BP-lowering agents, **ABPM** can be used to detect orthostatic hypotension or highly variable BP not buffered by autonomic nervous reflexes

Lifestyle Changes in Older Adults with Hypertension

Dietary changes, weight loss, and physical activity

Sodium Restriction

- Salt-sensitivity associated with age-related increases of BP, and salt-sensitivity increases with age

- TONE: randomized 975 independently living adults 60–80 years without serious physical or mental illness
- 40 mmol/d reduction in sodium, from ~ 3.5 to 2.5 g daily, **lowered BP 3.5/2 mmHg**

JAMA. 1998;279:839–46.

Weight Loss

- **3.5 kg weight loss, lowered BP 4/1 mmHg**
- Feasible, effective, safe lifestyle interventions for older persons with hypertension

- **ESH NOT recommend weight loss for adults ≥ 80 yrs** unless obesity severe, or individual robust given concerns of sarcopenia and malnutrition

JAMA. 1998;279:839–46.

Mediterranean-style Diet

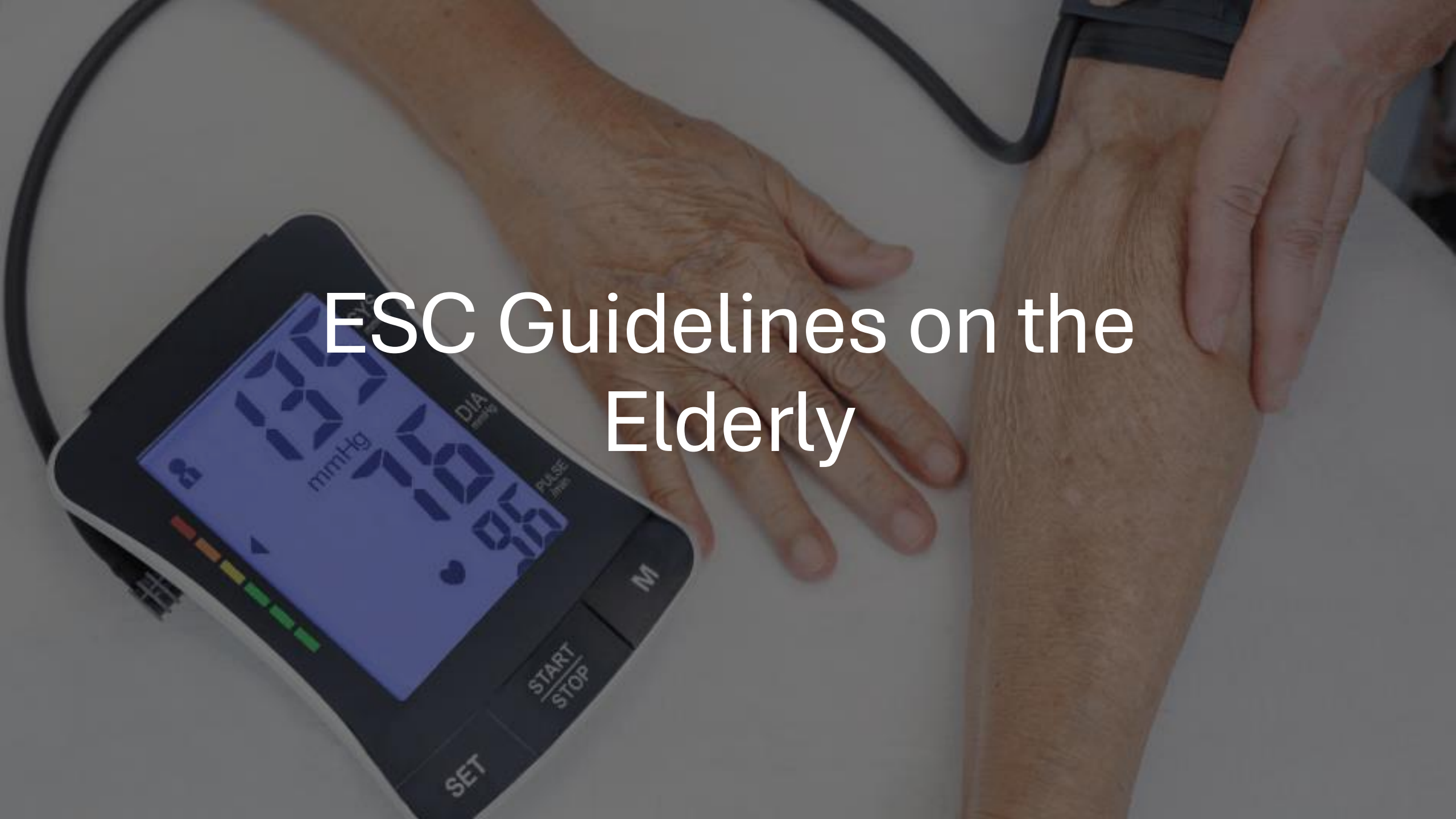
- Multicentre European 1 year study
- 65–79 years old
- Moderate in sodium (< 170 mmol)

- Adherence can **lower sBP 5.5 mmHg and decreases arterial stiffness year**

Hypertension. 2019;73:578–586.

Physical Activity

- Systematic review and meta-analysis of aerobic and resistance physical activity on BP of adults ≥ 60 years
- **Exercise lowered BP ~ 5.7/3.7 mmHg**
- Moderate- and high-intensity aerobic exercise may not be possible or preferred by many older adults
- **Low-intensity physical activity for 6 mins hourly** reduced sBP > 10 mmHg in overweight and obese highly sedentary adults



ESC Guidelines on the Elderly

Class IA Recommendations

Recommendations	Class[a]	Level[b]
It is recommended that treatment of elevated BP and hypertension among older patients aged <85 years who are not moderately to severely frail follows the same guidelines as for younger people, provided BP-lowering treatment is well tolerated.[131,523,524]	I	A
It is recommended to maintain BP-lowering drug treatment lifelong, even beyond the age of 85 years, if well tolerated.[523–525]	I	A

Who is NOT a candidate for <130 Target?

- Significant frailty and/or ≥85 years of age
- Pre-treatment symptomatic orthostatic hypotension
- Limited predicted lifespan (e.g. <3 years)
- High levels of competing risk for non-CVD death

Class IIA Recommendations

As the safety and efficacy of BP treatment is less certain in individuals with moderate or severe frailty, clinicians should consider screening older adults for frailty using validated clinical tests; frail patients' health priorities and a shared-decision approach should be considered when deciding on BP treatments and targets.[523,524,613,710]	**IIa**	**C**
When initiating BP-lowering treatment for patients aged ≥85 years, and/or with moderate-to-severe frailty (at any age), long-acting dihydropyridine CCBs or RAS inhibitors should be considered, followed if necessary by low-dose diuretic if tolerated, but preferably not a beta-blocker (unless compelling indications exist) or an alpha-blocker.[711]	**IIa**	**B**

Conclusions