Hypertension Treatment in Older Adults: Balancing Efficacy and Safety

28th Annual Clinical Update in GERIATRIC MEDICINE

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ASHOK KRISHNASWAMI, MD, MAS, FACC
DIVISION OF CARDIOLOGY, KAISER PERMANENTE SAN JOSE MEDICAL CENTER
ASSOCIATE PROFESSOR, DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS, UCSF
TWITTER: @CARDSKRISH

Always great to be back in the 'Burg

Yinz"
"Pop"
"worshd."

DISCLOSURES

- None
- One Confession
  - ☺

Today's Agenda

- Brief background
- Efficacy and Safety of intensive BP
- Perception of benefit versus harm
  - Individual vs Composite Safety Outcomes
  - RMST
  - TTB/TTH
- Care of the Multimorbid Older Adult

NOTHING IS FREE

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

Whelton PK, et al. 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. J Am Coll Cardiol. 2018;71:e127-e248.

2017 Hypertension Guidelines

Cross-sectional and longitudinal epidemiologic studies in older adults have raised questions about the benefits of more intensive antihypertensive treatment and the relationship between BP lowering and risk of falls (S10.3.1-13). Treatment of elevated BP in older persons is challenging because of a high degree of heterogeneity in comorbidity, as well as poly-pharmacy, frailty, cognitive impairment, and variable life expectancy. However, over the past 3 decades, RCTs of antihypertensive therapy have included large numbers of older persons, and in every instance, including when the SBP treatment goal was <120 mm Hg, more intensive treatment has safely reduced the risk of CVD for persons over the ages of 65, 75, and 80 years

https://doi.org/10.1016/j.jacc.2017.11.006

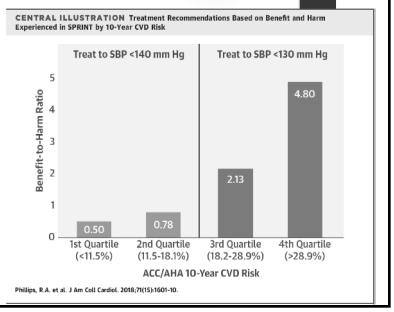
#AGS18 Pro/con debate

Balancing MACE ⇩ without ⇧ SAE

The Use of Risk Scores to Guide Who Should Be Treated ?

Some Thoughts:

1. Highest Quartiles have to be the most aggressively treated
2. Age >=75
   a) Q1: 0.1-0.4%
   b) Q2: 2.3-3.0%
   c) Q3: 16.7-18.1%
   d) Q4: 79.8-80.7%
3. Oldest probably highest risk of harm
4. Does Addressing MACE Reduction as a Function of Risk Apply to Geriatric Population?

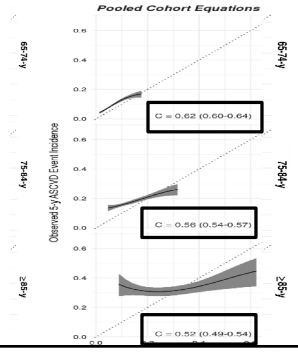


Failure of Traditional Risk Factors to Adequately Predict Cardiovascular Events in Older Populations.

Exposures : PCE model

The primary outcome was major ASCVD events, defined as a composite of myocardial infarctions, stroke, and cardiovascular death.

Dalton et al. DOI: 10.1111/jgs.16329



Intensive blood pressure lowering in different age categories: insights from the Systolic Blood Pressure Intervention Trial

- Conclusion: In SPRINT, the benefits and risks of intensive blood pressure lowering did not differ according to the age categories.

Byrne C, Pareek M, Bhatt D et al. European Heart Journal - Cardiovascular Pharmacotherapy. doi:10.1093/ehjcvp/pvz050

CASE

- 81 year old presents to clinic
  - DM, HTN, past stent 5 years ago, h/o stroke 10 years ago, CKD(stage 3) for follow up from hospitalization for pneumonia
  - ADLs – complete
  - IADLs- 50% reduction
  - *Nagi & Rosow-Breslau activities: 75% reduced
- WHAT SHOULD BE THE IDEAL BP RANGE ?
  - Exclusions to achieving "Normalcy"?
    - DM, Nursing Home, CVA, limited life expectancy, autonomic dysfunction(Parkinson's disease)

*Pushing/pulling large object; crouching or kneeling; lifting > 10 lbs, reaching above shoulder; Writing/handling small objects; walks flight of stairs; walks half a mile; heavy work around house

SHOULD WE BE TREATING BP in OLDER ADULTS SIMILAR TO YOUNGER ADULTS ?

- ▶Forced to follow the guidelines?
- ▶Forced to follow the guidelines?
- ▶Forced to follow the guidelines?
- ▶Forced to follow the guidelines?

BUT – Do I really have to ?

SHOULD WE BE TREATING BP in OLDER ADULTS SIMILAR TO YOUNGER ADULTS ?

- ▶My Opinion – NO
- ▶Raises Issues of Chronological vs Physiological Age

Blood pressure targets in the elderly: many guidelines, much confusion

Table 1 Comparison of guidelines for the treatment of arterial hypertension

	ESH/ESC 2013[4]	ESC/ESH 2018[3]	AHA/ACC 2017[2]	ACP/AAFP 2017[6]
Definition of arterial hypertension	≥140/90 mmHg	≥140/90 mmHg	≥130/80 mmHg	
Blood pressure target value	<140/90 mmHg	SBP 120–130 mmHg, DBP 70–80 mmHg	<130/80 mmHg	
Exceptions	Diabetics: <140/85 mmHg	None	None	
Definition of 'old' patients	>80 years	65–79 years (elderly)	>80 years (very old)	≥65 years	≥60 years
Initiation of antihypertensive therapy in elderly patients	SBP >160 mmHg	≥140/90 mmHg (elderly)/≥160/90 mmHg (very old)	≥130/80 mmHg	SBP ≥150 mmHg
Blood pressure target value in older patients	SBP 140–150 mmHg, DBP <90 mmHg	SBP 130–140 mmHg, DBP 70–80 mmHg	<130/80 mmHg	SBP <150 mmHg[a]

AAFP, American Academy of Family Physicians; ACC, American College of Cardiology; ACP, American College of Physicians; AHA, American Heart Association; DBP, diastolic blood pressure; ESC, European Society of Cardiology; ESH, European Society of Hypertension; SBP, systolic blood pressure.
[a]If a stroke or transient ischaemic attack has occurred, a target blood pressure <140 mmHg may be considered.

European Heart Journal (2019) 40, 2029–2031; doi:10.1093/eurheartj/ehz150

GERIATRICIANS'S POINTOF VIEW: Following CPG in Older Adults May Be Dangerous to Well Being

Conclusions This review suggests that adhering to current CPGs in caring for an older person with several comorbidities may have undesirable effects. Basing standards for quality of care and pay for performance on existing CPGs could lead to inappropriate judgment of the care provided to older individuals with complex comorbidities and could create perverse incentives that emphasize the wrong aspects of care for this population and diminish the quality of their care. Developing measures of the quality of the care needed by older patients with complex comorbidities is critical to improving their care.

JAMA. 2005;294:716-724 www.jama.com

Clinical Practice Guidelines and Quality of Care for Older Patients With Multiple Comorbid Diseases
Implications for Pay for Performance

Cardiologist's Point of View – regarding HTN Guideline

CARDIOVASCULAR MEDICINE AND SOCIETY

Are Guidelines for Treatment of Hypertension Trustworthy?

Study-level meta-analysis (N=9)

- 1.1% ARR;16% RRR – MACE (p= 0.033)
- 0.5% absolute or 18% relative risk reduction in stroke (p =0.012)
- No impact on MI, HF, renal adverse events, CV death or all-cause death

Benefit: risk tradeoff - not formally considered in SR

Risk-based HTN treatment – "defensible, but not strictly speaking evidence-based"

https://doi.org/10.1016/j.jacc.2019.04.009

Heavy Representation in HTN CPG of SPRINT

CARDIOVASCULAR MEDICINE AND SOCIETY

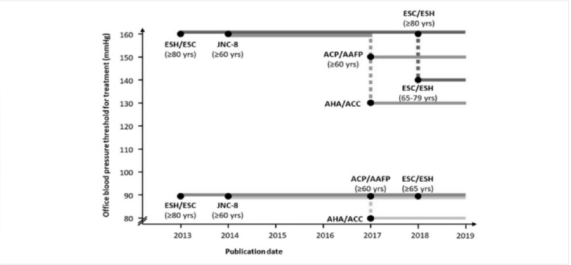
Are Guidelines for Treatment of Hypertension Trustworthy?

- 1st - Restricted enrollment
- 2nd - The accuracy and feasibility of BP measurement
- 3rd - Imbalance in cardioprotective therapies (e.g., diuretics) or down-titration of therapies (e.g., 87% required >1 dose reduction and withdrawal in 7.5% in standard arm)
- 4th- Trial design and conduct issues

https://doi.org/10.1016/j.jacc.2019.04.009

Efficacy of Intensive Therapy

Systolic and diastolic BP targets in older adults – over the decade



European Heart Journal (2019) 40, 2029–2031; doi:10.1093/eurheartj/ehz150

BPAT ENTRY AND TARGET BP Goals – Before 2008

Table 2 Characteristics of trials recruiting individuals aged 80 and over

	EWPHE[4]	STOP[5]	SHEP[6]	Syst-Eur[6]
BP at entry (mmHg)	182/101	195/102	179/77	174/85
Target BP (mmHg)	160/90	160/95	140 mmHg systolic	140 mmHg systolic
Drop on placebo (mmHg)	10/7	9/6	15/6	13/2
Difference between active + placebo (mmHg)	23/9	19/9	11/3	10/5

EWPHE, European Working Party on Hypertension in the Elderly; SHEP, The Systolic Hypertension in the Elderly Program; STOP, Swedish Trial in Old Patients with Hypertension; Syst-EuR, the Systolic Hypertension in Europe trial (Syst-Eur); HYVET, Hypertension in the Very Elderly Trial.

The concern: before 2008

Table 1 Outcome for those aged 80 and over in intervention trials on the elderly and trial medication used

	EWPHE[4]	STOP-H[5]	SHEP[6]	Syst-Eur[7]	HYVET Pilot[8]
Trial Outcome for those aged 80 or more	No benefit	No benefit	Fall in non-fatal stroke, Not for fatal events	Fall in non-fatal stroke, Not for fatal events	Fall in stroke, not for fatal events
Medication Steps	(1) Thz (2) Dble dose (3) Methyldopa (4) Dble dose	(1) Thz/BB (2) Thz/BB (3) OL	(1) Non-Thiazide (2) Dble dose (3) BB (4) Dble dose	(1) CCB (2) ACE-I/Thz	(1) Thz/ACE-I (2) Dble Dose (3) CCB (4) Dble dose

EWPHE, European Working Party on Hypertension in the Elderly; SHEP, The Systolic Hypertension in the Elderly Program; STOP, Swedish Trial in Old Patients with Hypertension; Syst-EuR, Systolic Hypertension in Europe trial (Syst-Eur); HYVET Pilot, Hypertension in the Very Elderly Trial Pilot study; ACE-I, angiotensin-converting enzyme inhibitor; Thz, thiazide; BB, beta-blocker; Dble, double; OL, open label; CCB, calcium-channel blocker.

SHEP, Syst-Eur and HYVET pilot, and meta-analysis - suggested that treatment of HTN associated with a reduction in stroke but a possible increase in all-cause mortality.

Treatment of Hypertension in Patients 80 Years of Age or Older

Nigel S. Beckett, M.B., Ch.B., Ruth Peters, Ph.D., Astrid E. Fletcher, Ph.D., Jan A. Staessen, M.D., Ph.D., Lisheng Liu, M.D., Dan Dumitrascu, M.D., Vassil Stoyanovsky, M.D., Riitta L. Antikainen, M.D., Ph.D., Yuri Nikitin, M.D., Craig Anderson, M.D., Ph.D., Alli Belhani, M.D., Françoise Forette, M.D., Chakravarthi Rajkumar, M.D., Ph.D., Lutgarde Thijs, M.Sc., Winston Banya, M.Sc., and Christopher J. Bulpitt, M.D., for the HYVET Study Group*

- N=3,845; Average Age: ~ 84 years
- 195 centers, 13 countries
- Primary end-point: Any Stroke (fatal or nonfatal)
- Secondary end points: all-cause mortality, CV mortality, mortality from cardiac causes or stroke
- Target < 150 mmHg

N Engl J Med 2008;358:1887-98

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- 21% reduction in all-cause mortality (P = 0.02) – "Unexpected Finding"
- 32% reduction in stroke - including late arriving data
- CV events (fatal, non-fatal stroke/MI/HF) reduced: HR 0.66 (95% CI: 0.53-0.82)
- HF events reduced : HR 0.36 (95% CI: 0.22-0.58)

N Engl J Med 2008;358:1887-98
European Heart Journal (2014) 35, 1712–1718

Outcomes of Intensive Blood Pressure Lowering in Older Hypertensive Patients

Chirag Bavishi, MD, MPH,[a] Sripal Bangalore, MD, MHA,[b] Franz H. Messerli, MD[c,d]

	JATOS (13)	VALISH (14)	Wei et al. (15)
Yr	2008	2010	2013
Participants	4,418	3,079	724
Inclusion criteria	Essential hypertension, age 65-85 yrs	Isolated systolic hypertension, age 70-85 yrs	Essential hypertension, age ≥70 yrs
Trial location	Japan	Japan	China
Comparison	Intensive (<140 mm Hg) vs. standard (140-159 mm Hg) lowering	Intensive (<140 mm Hg) vs. standard (140-149 mm Hg) lowering	Intensive (<140 mm Hg) vs. standard (140-149 mm Hg) lowering
Drug strategy	Efonidipine with add-on other antihypertensive agents if needed.	Valsartan with add-on other antihypertensive agents if needed.	Protocol based
Median follow-up, yrs	2	3.1	4*
MACE definition	MI, angina pectoris requiring hospitalization, heart failure, sudden death, dissecting aneurysms of the aorta, and occlusive arterial disease	Cardiovascular death, nonfatal stroke, and nonfatal myocardial infarction	Fatal/nonfatal stroke, acute MI, and other cardiovascular deaths (sudden death and heart failure death)
Mean in-treatment difference, mm Hg	9.7/3.3	5.4/1.7	14/6

CVD =cardiovascular diseases; JATOS = Japanese Trial to Assess Optimal Systolic Blood Pressure in Elderly Hypertensive Patients; MACE = major adverse cardiovascular event(s); MI = myocardial infarction; VALISH= Valsartan in Elderly Isolated Systolic Hypertension. J Am Coll Cardiol 2017;69:486–93

Outcomes of Intensive Blood Pressure Lowering in Older Hypertensive Patients

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TABLE 3 Pooled Relative Risk of Efficacy and Safety Outcomes With Intensive Versus Standard BP Lowering in Elderly Patients

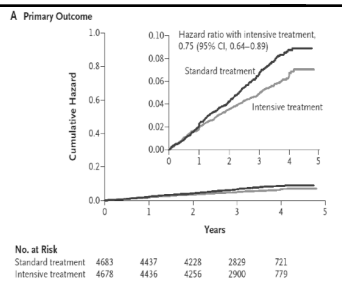
Clinical Outcomes	Intensive BP Lowering	Standard BP lowering	Pooled RR (95% CI)	p Value	I^2
Efficacy					
MACE	200/5,437 (3.7)	280/5,420 (5.2)	0.71 (0.60-0.84) ★	0.0001	0
Cardiovascular mortality	60/5,437 (1.1)	94/5,420 (1.7)	0.67 (0.45-0.98) ★	0.04	25%
Myocardial infarction	57/5,437 (1.0)	72/5,420 (1.3)	0.79 (0.56-1.12)	0.18	0
Stroke	116/5,437 (2.1)	142/5,420 (2.6)	0.80 (0.61-1.05)	0.11	19%
Heart failure	49/3,892 (1.3)	79/3,886 (2.0)	0.63 (0.40-0.99) ★	0.04	21%
Safety					
Serious adverse events	1,274/5,074 (25.1)	1,252/5,059 (24.7)	1.02 (0.94-1.09)	0.69	19%
Renal failure	57/5,067 (1.1%)	28/5,049 (0.6)	1.81 (0.86-3.80)	0.12	46%

J Am Coll Cardiol 2017;69:486–93

2015

A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group‡



DOI: 10.1056/NEJMoa1511939

ARR: 1.6%; NNT: 63

2015

A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group‡

Outcome	Intensive Treatment		Standard Treatment		Hazard Ratio (95% CI)	P Value
	no. of patients (%)	*% per year*	*no. of patients (%)*	*% per year*		
All participants	**(N = 4678)**		**(N = 4683)**		★	
Primary outcome†	243 (5.2)	1.65	319 (6.8)	2.19	0.75 (0.64–0.89)	<0.001
Secondary outcomes						
Myocardial infarction	97 (2.1)	0.65	116 (2.5)	0.78	0.83 (0.64–1.09)	0.19
Acute coronary syndrome	40 (0.9)	0.27	40 (0.9)	0.27	1.00 (0.64–1.55)	0.99
Stroke	62 (1.3)	0.41	70 (1.5)	0.47	0.89 (0.63–1.25)	0.50
Heart failure	62 (1.3)	0.41	100 (2.1)	0.67	★ 0.62 (0.45–0.84)	0.002
Death from cardiovascular causes	37 (0.8)	0.25	65 (1.4)	0.43	★ 0.57 (0.38–0.85)	0.005
Death from any cause	155 (3.3)	1.03	210 (4.5)	1.40	★ 0.73 (0.60–0.90)	0.003
Primary outcome or death	332 (7.1)	2.25	423 (9.0)	2.90	0.78 (0.67–0.90)	<0.001

DOI: 10.1056/NEJMoa1511939

ARR: 1.6%; NNT: 63

Original Investigation

Intensive vs Standard Blood Pressure Control and Cardiovascular Disease Outcomes in Adults Aged ≥75 Years
A Randomized Clinical Trial

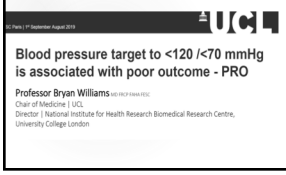
- Among ambulatory adults aged 75 years or older, INTENSIVE THERAPY compared with STANDARD THERPY: resulted in significantly lower rates of fatal and nonfatal major cardiovascular events and death from any cause.

JAMA. 2016;315(24):2673-2682. doi:10.1001/jama.2016.7050

Sprint controversy continues


The SPRINT trial: A major advance in treating high blood pressure

Cardiologists: Thumbs Down To SPRINT


Blood pressure target to <120 /<70 mmHg is associated with poor outcome - PRO

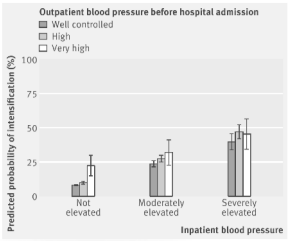
Professor Bryan Williams
Chair of Medicine | UCL
Director | National Institute for Health Research Biomedical Research Centre, University College London

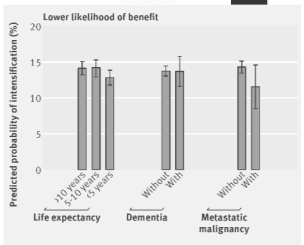
Blood pressure target to <120/<70 mmHg associated with poor outcome: Con position


Paolo Verdecchia, M.D., F.E.S.C., F.A.C.C.
Fondazione Umbra Cuore e Ipertensione-ONLUS
Department of Cardiology
Hospital Santa Maria della Misericordia
Perugia, Italy

Safety of Intensive Therapy

Observational studies of safety of BP therapy





- 1 in 7 previously well controlled adults– admitted to a hospital – discharged with intensified anti-HTN Rx.

BMJ 2018;362:k3503 | doi: 10.1136/bmj.k3503

Observational studies of safety of BP therapy

	Overall (n=90 127 Serious Fall Injuries)			Previous Hypertension Diagnosis* (n=90 127 Serious Fall Injuries)			No Recent Hospitalization† (n=60 211 Serious Fall Injuries)		
	Case Period n (%)‡	Control Periods n (%)§	OR (95% CI)	Case Period n (%)‡	Control Periods n (%)§	OR (95% CI)	Case Period n (%)‡	Control Periods n (%)§	OR (95% CI)
Initiation	272 (0.30)	1201 (0.22)	1.36 (1.19–1.55)	159 (0.18)	701 (0.13)	1.36 (1.15–1.62)	146 (0.24)	635 (0.18)	1.38 (1.15–1.65)
Addition of new class	1508 (1.67)	7820 (1.45)	1.16 (1.10–1.23)	1276 (1.42)	6664 (1.23)	1.15 (1.09–1.23)	687 (1.14)	3450 (0.95)	1.20 (1.10–1.30)
Titration	3113 (3.45)	16714 (3.09)	1.13 (1.08–1.18)	2696 (2.99)	14542 (2.69)	1.12 (1.08–1.17)	1432 (2.38)	7662 (2.12)	1.13 (1.07–1.20)

- [1]Anti HTN Rx initiation and intensification >> associated with >> SHORT TERM but not long term increased risk of falls in older adults.

[1]*Circ Cardiovasc Qual Outcomes*. 2016;9:222-229.

Observational studies of safety of BP therapy

- Risk of serious fall injuries
- Previous falls
  - 2.17 (95%CI, 0.98-4.80)-moderate-intensity
  - 2.31 (95%CI, 1.01-5.29) - high-intensity

Antihypertensive Use	Full Cohort (n = 4961)[a]
Antihypertensive intensity[c]	
None	1 [Reference]
Moderate	1.40 (1.03-1.90)
High	1.28 (0.91-1.80)
Antihypertensive class[d]	
RAS blocker	0.93 (0.76-1.14)
β-Blocker	0.96 (0.79-1.17)
Calcium channel blocker	1.06 (0.87-1.30)
Diuretic	1.06 (0.86-1.32)

[1]*JAMA Intern Med*. 2014;174(4):588-595

Observational studies of safety of BP therapy - SPRINT SUBGROUP ANALYSES

IT and Efficacy

- Lowers risk of MACE, MCI and Death

IT and Safety

- Higher risk
  - Renal dysfunction
  - Hypotension, possibly syncope, but not falls.
  - "No variation according to age"

JAGS 2019 Dec 16. doi: 10.1111/jgs.16272; JAGS 66:679–686, 2018.

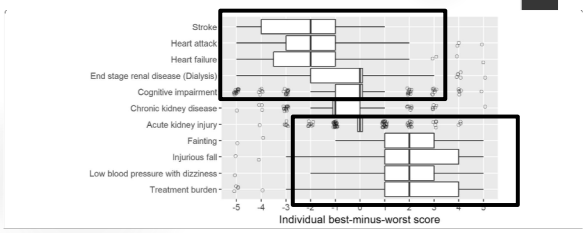
Patient perceptions of safety of BP therapy

Intensive Therapy in SPRINT

- NOT associated with increased concern of falls in older adults healthy enough to participate in SPRINT.

JAGS 2019 Nov 28. doi: 10.1111/jgs.16264

Patient perceptions of safety of BP therapy



- " Our results indicate that none of the outcomes should be disregarded for clinical practice guidelines and health economic assessments"

Aschmann et al. Health and Quality of Life Outcomes (2019) 17:186 https://doi.org/10.1186/s12955-019-1250-6

2017 Hypertension Guidelines

Cross-sectional and longitudinal epidemiologic studies in older adults have raised questions about the benefits of more intensive antihypertensive treatment and the relationship between BP lowering and risk of falls (S10.3.1-13). Treatment of elevated BP in older persons is challenging because of a high degree of heterogeneity in comorbidity, as well as poly-pharmacy, frailty, cognitive impairment, and variable life expectancy. However, over the past 3 decades, RCTs of antihypertensive therapy have included large numbers of older persons, and in every instance, including when the SBP treatment goal was <120 mm Hg, more intensive treatment has safely reduced the risk of CVD for persons over the ages of 65, 75, and 80 years.

https://doi.org/10.1016/j.jacc.2017.11.006

HYVET – Safety

- Suboptimal reporting of SAEs
- Reported SAEs (Placebo: 448; Treatment: 358,P = 0.001)
- "5 related to Rx"

N Engl J Med 2008;358:1887-98.

MOVING forward – 2010 - ACCORD

4733 participants – ACCORD – 2362 (IT)/ 2371(ST)

FINDINGS: IT did NOT reduce the rate of a composite outcome of fatal and nonfatal major cardiovascular events

N Engl J Med 2010;362:1575-85.

ACCORD SAFETY

Table 2. Serious Adverse Events and Clinical Measures after Randomization.*

Variable	Intensive Therapy (N = 2362)	Standard Therapy (N = 2371)	P Value
Serious adverse events — no. (%)†			
Event attributed to blood-pressure medications	77 (3.3)	30 (1.27)	<0.001
Hypotension	17 (0.7)	1 (0.04)	<0.001
Syncope	12 (0.5)	5 (0.21)	0.10
Bradycardia or arrhythmia	12 (0.5)	3 (0.13)	0.02
Hyperkalemia	9 (0.4)	1 (0.04)	0.01
Angioedema	6 (0.3)	4 (0.17)	0.55
Renal failure	5 (0.2)	1 (0.04)	0.12
End-stage renal disease or need for dialysis	59 (2.5)	58 (2.4)	0.93
Symptoms affecting quality of life — no./total no. (%)‡			
Hives or swelling	44/501 (8.8)	41/468 (8.8)	1.00
Dizziness when standing	217/501 (44.3)	188/467 (40.3)	0.36
Adverse laboratory measures — no. (%)			
Potassium <3.2 mmol/liter	49 (2.1)	27 (1.1)	0.01
Potassium >5.9 mmol/liter	73 (3.1)	72 (3.0)	0.93
Elevation in serum creatinine			
>1.5 mg/dl in men	304 (12.9)	199 (8.4)	<0.001
>1.3 mg/dl in women	257 (10.9)	168 (7.1)	<0.001
Estimated GFR <30 ml/min/1.73 m²	99 (4.2)	52 (2.2)	<0.001

SPRINT: SAFETY

Possibly or Definitely Related

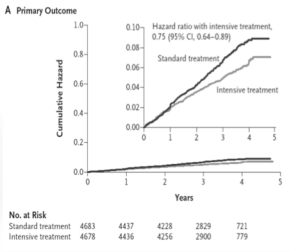
(4.7%- IT) vs (2.5%- ST) had SAEs that were classified as possibly or definitely related to the intervention

(HR 1.88; P<0.001)

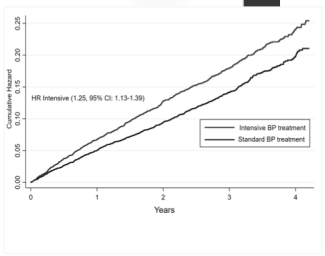
Table 3. Serious Adverse Events, Conditions of Interest, and Monitored Clinical Events.

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
Emergency department visit or serious adverse event				
Hypotension	158 (3.4)	93 (2.0)	1.70	<0.001
Syncope	163 (3.5)	113 (2.4)	1.44	0.003
Bradycardia	104 (2.2)	83 (1.8)	1.25	0.13
Electrolyte abnormality	177 (3.8)	129 (2.8)	1.38	0.006
Injurious fall†	334 (7.1)	332 (7.1)	1.00	0.97
Acute kidney injury or acute renal failure‡	204 (4.4)	120 (2.6)	1.71	<0.001

COMPOSITE OUTCOMES: EFFICACY/SAFETY



5-Point Composite MACE (MI, other ACS, CVA, HF, or CV death) at 4.2 years. Absolute risk reduction with intensive BP therapy = 1.62%, NNT=62; (SPRINT Research Group; N Engl J Med 2015;373:2103-16

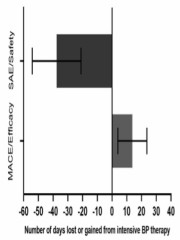


6-Point Composite Safety Outcome (SAE + ER visits) at 4.2 years. Absolute risk increase with intensive BP therapy = 3.23%, NNH= 31. (Krishnaswami et al. Efficacy and Safety of Intensive Blood Pressure Therapy Using RMST – Insights from the SPRINT Trial. DOI: https://doi.org/10.1016/j.amjmed.2019.12.050)

Is it time for personalizing BP treatment in older adults?

Restricted mean survival time: a translational statistic

- At 4.2 years, intensive blood pressure therapy participants had a statistically significant 13.8 (+ 3.9 to + 23.6, P=0.006) more MACE-free days, compared to standard blood pressure therapy participants
- At 4.2 years, intensive therapy participants had 37.7 (-54.2 to -21.1, P=0.0001) fewer SAE-free days, compared to standard therapy participants



Krishnaswami A, Peterson E, Kim DH, Goyal P, Rich, M. Efficacy and Safety of Intensive Blood Pressure Therapy Using Restricted Mean Survival Time – Insights from the SPRINT Trial . American Journal of Medicine. In Press. DOI: https://doi.org/10.1016/j.amjmed.2019.12.050).

TIME TO BENEFIT/HARM

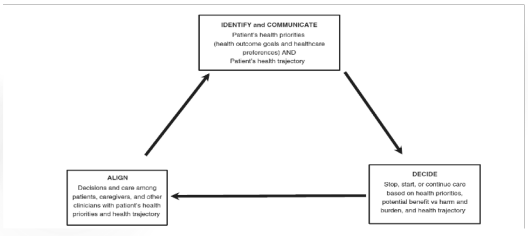
Table 1. Time to Benefit for Preventive Interventions for Older Adults

Time to Benefit, Years	Preventive Intervention	Guideline	References
5–10 months	Bisphosphonates for osteoporosis	None	15
1–2	Primary prevention, hypertension	None	16,17,31
2–5	Primary prevention with statins	None	32,[illegible]
5	Surgical (vs transcatheter) aortic valve replacement for high risk aortic stenosis	None	33
6–8	Open (vs endovascular) repair for abdominal aortic aneurysm	None	23
10	Aspirin for cardiovascular disease and colorectal cancer prevention	USPSTF	34
10	Intensive glycemic control in diabetes mellitus	American Geriatrics Society	35
10	Colorectal cancer screening	USPSTF, American College of Physicians, Society of General Internal Medicine	1,36–38
10	Breast cancer screening	Society of General Internal Medicine, American College of Physicians	1,37,38
10–15	Prostate cancer screening	American Urological Association, American College of Physicians	11,22,37

USPSTF = U.S. Preventive Services Task Force.

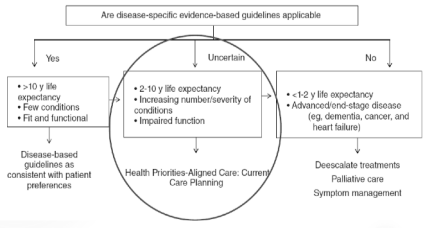
J Am Geriatr Soc 66:229–234, 2018

Decision Making for Older Adults With Multiple Chronic Conditions



Boyd et al. JAGS 67:665–673, 2019

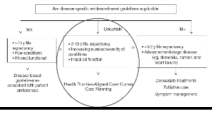
Decision Making for Older Adults With Multiple Chronic Conditions



Boyd et al. JAGS 67:665–673, 2019

CASE- 81 year old presents to clinic

- DM, HTN, past stent 5 years ago, h/o stroke 10 years ago, CKD(stage 3) for follow up from hospitalization for pneumonia
- Get an understanding of days gained/days lost with intensive BP, TTB,TTH, Life Expectancy
- Shared decision making



"Creating geriatric sensitive primary care physicians, cardiologists (subspecialists) by increasing the evidence-base of benefits and harms is, in my opinion, the next frontier"

THANK YOU !!!