Absolute Risk-Based Treatment Using Adaptive Blood Pressure Thresholds and Targets Is Crucial to Older Multimorbid Patients With High Fall Risk

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See related article, pp e13–e115

In essence, the 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults[1] advises physicians to consider, in eligible adults, starting blood pressure (BP) lowering treatment at threshold BP ≥120/80 mm Hg and targeting a BP <130/80 mm Hg. In the clinical practice guidelines for hypertension of the Ministry of Health, Singapore,[2] the systolic BP (SBP) treatment thresholds, and the associated targets, are 10 mm Hg higher. The different approach stems from concerns about (1) aggressive treatment causing net harm to vulnerable patients and (2) applying BP targets achieved in highly-selected, mostly white, populations within randomized controlled trials to the older, multimorbid, falls-prone persons in a community comprising 76% Chinese, 15% Malay, 7.5% Indian, and 1.5% diverse races.

In Singapore, approved digital oscillometric monitors have largely, but not totally, superseded analog mercury-column or aneroid manometers; but oscillometric home BP-monitoring is not universal. Disregarding the measurement technique, what factors promote falsely high BP readings? First, activation of the adrenergic nervous system by any combination of anxiety, exertion, ambient noise, smoking, caffeine, or a full bladder, raises the BP significantly. Crucially too, the alerting presence of other persons often increases the BP, further enhancing the risk of overtreatment.[3,4] SPRINT (Systolic Blood Pressure Intervention Trial) used an oscillometric monitor to measure the BP while unattended patients sat quietly, thus optimizing the BP thresholds and the achieved targets.[5] In contrast, the SBP recorded in attended persons in bustling clinics can overestimate the true SBP by up to 12 mm Hg.[3]

Second, none of the SPRINT patients had a wide pulse pressure.[5] In older persons, any combination of atrial fibrillation, stiffer arteries, and wide pulse pressure (as in isolated systolic hypertension) might yield misleadingly high BP by skewing the piezo-resistance of an oscillometric transducer. For instance, oscillometric devices record 4 to 6 mm Hg higher SBP and diastolic BP in atrial fibrillation than in sinus rhythm,[6] so the true BP in older persons with atrial fibrillation, importantly, might be even lower than optimal oscillometry shows.

Finally, the SD is ±8 to 10 mm Hg for the mean of 3 SBP measurements in one subject under standardized conditions, assuming a true SBP of 150 mm Hg and normal distribution.[7] Narrowing the SD toward ±5 mm Hg would require at least 10 BP measurements. This unrealistic requirement also applies to home-monitored SBP.[7] Lowering the SBP from ≥140 to <130 mm Hg in community practice will pose risks to vulnerable patients. For illustration, shifting a mean initial SBP from 150 mm Hg in 68% (±1 SD) of a group of patients to <130 mm Hg entails achieving a true mean SBP of 120 mm Hg (Table).

Moreover, shifting 95.5% (±2 SD) of the group to a target mean SBP of <130 mm Hg would require the lower 48% of patients to achieve true SBPs of 111 to 93 mm Hg. Therefore, physicians targeting an SBP of <130 mm Hg might overtreat vulnerable patients, potentially causing any or all of postural hypotension, falls, and underperfusion of the brain and kidneys. Also, intensive treatment entails 3 or more antihypertensive drugs, intensive review, and more nonadherence to treatment. By extension, shifting the target mean SBP even lower to 120 mm Hg in 95.5% of the patients requires 48% to reach true SBPs of 101 to 83 mm Hg, greatly raising the risk of net harm.

Furthermore, a parallel underperfusion of the myocardium linked to an excessive reduction in diastolic BP might explain, in part, the failure of SPRINT to decrease mortality from myocardial infarction, heart failure, and all cardiovascular events.[5] This failed objective also occurred in hypertensives with stable coronary artery disease who achieved SBP of <120 mm Hg and diastolic BP of <70 mm Hg.[8]

Antihypertensive treatment eligibility is based on the 10% ten-year cardiovascular disease risk calculation in the Guidelines discussed.[1,2] Crucially, however, what randomized controlled trial outcomes evidence supports the SBP target of 130 mm Hg[1] in the typical hypertensive person with diabetes mellitus or chronic kidney disease (CKD)?[9] A recent meta-analysis of 49 randomized controlled trials involving 73 738 diabetic hypertensives suggests that an SBP target ≤139 mm Hg is linked to increased cardiovascular death, with no observed benefit compared with 140 mm Hg.[10] In

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(*Hypertension*. 2018;71:988-989.
DOI: 10.1161/HYPERTENSIONAHA.118.11297.)

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Hypertension **is available at http://hyper.ahajournals.org**
DOI: 10.1161/HYPERTENSIONAHA.118.11297

Table. Achieved SBP Required for Treated Patients to Have Upper Bound BP Levels Representing the Target SBPs of <130 mm Hg and <120 mm Hg, Respectively, According to the Proportion of All the Treated Patients Included

Proportion of All Treated Patients Included in Designated Range*	Achieved SBP, mm Hg					
	Target SBP of <130 mm Hg[1]			Target SBP of <120 mm Hg		
	Upper Bound	Mean SBP Required	Lower Bound	Upper Bound	Mean SBP Required	Lower Bound
68.3% (±1 SD)	129	120	111	119	110	101
95.5% (±2 SD)	129	111	93	119	101	83

SBP indicates systolic blood pressure.

*Assuming an average before-treatment BP of 150 mm Hg, normal distribution of BP values, and SD of 9 mm Hg for 3 measurements.[7]

Singapore, we need a large Asian (Chinese–Malay–Indian) database using the rigorous methodologic criteria for randomized controlled trial selection applied in Joint National Committee 8.[11]

Large-scale trials of 5 or more years' duration should be conducted to the exacting standards of Joint National Committee 8[11] and SPRINT,[5] in subgroups such as elderly persons at high risk for end-organ underperfusion (eg, previous stroke,[12] and CKD patients with high coronary risk), and diabetics with autonomic neuropathy. Also, whether a lower SBP target of ≤120 mm Hg is justified in moderate cardiovascular-risk patients aged 79 years or younger, with BP of 125 to 139/75 to 89 mm Hg, conversely without diabetes mellitus or significant CKD, remains to be proven beyond reasonable doubt. Ideally, a future meta-analysis for all the above populations would exclude BP data acquired using obsolete devices under suboptimal conditions. Last, we should routinely set treatment targets according to each person's absolute risk for cardiovascular events.[4,9]

The Singapore clinical practice guidelines advise the multipronged management of persons with elevated BP, and hypertension at all stages.[2] The nominal BP targets in those aged 80 years or more, diabetic patients, and CKD patients with moderate and severe albuminuria are 150/90, 140/80, and 130/80 mm Hg respectively. The target advised in other adults is 140/90 mm Hg. However, the physician may judiciously lower the home-monitored SBP toward 130 mm Hg, working with selected patients (absent diabetes mellitus or CKD) who are at high cardiovascular risk, but at low risk for falls and underperfusion of the brain, kidneys, and heart. The objective is to produce optimum clinical outcomes for individuals by adaptive treatment having assessed the incremental risk:benefit ratio.

Disclosures

None.

Acknowledgments

The author's views are his own and might not reflect those of other contributors to the clinical practice guidelines on hypertension of the Ministry of Health Singapore.[2]

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Hypertension
Journal of the American Heart Association

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Hypertension. 2018;71:988-989; originally published online April 23, 2018;
doi: 10.1161/HYPERTENSIONAHA.118.11297
Hypertension is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0194-911X. Online ISSN: 1524-4563

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