Was there a recent study that concluded that a goal BP of 120/80 should be the target in geriatric patients?
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Hypertension (HTN) is highly prevalent in today's society, especially among individuals over the age of 60 years.[1,2] It is estimated that approximately 78 million adults in the United States have hypertension. There are many risks associated with high blood pressure (BP) including cardiovascular events, stroke, heart failure (HF), and death. It is therefore important to look to guidelines for treatment recommendations in order to mitigate these risks. There are several published guidelines that address treatment of HTN; current guideline recommendations vary, but the organizations generally recommend treating to a target BP of <140/90 mmHg.[3-7] In regard to older individuals, the Eighth Joint National Committee (JNC8) recommends treating to a target BP of <150/90 mmHg in patients ≥60 years of age.[3] The American Society of Hypertension (ASH) and International Society of Hypertension (ISH), as well as the European Society of Hypertension (ESH) and European Society of Cardiology (ESC) recommend targets of <150/90 mmHg and <140-150/90 mmHg, respectively, in patients ≥80 years of age.[4,5] Regardless of age, the International Society of Hypertension in Blacks (ISHIB) recommends lower targets of <130-135/80-85 mmHg.[6] Although not specified, the American Heart Association (AHA), American College of Cardiology (ACC), and Centers for Disease Control and Prevention (CDC) acknowledge that lower BP goals than the recommended <140/90 mmHg may be appropriate in select populations such as the elderly.[7] Due to the varying recommendations, it is important to look to relevant studies to determine which BP targets may be more beneficial.

One recent study that evaluated a target systolic blood pressure (SBP) goal of <120 mmHg in older individuals is the SPRINT trial.[8] The SPRINT research group conducted a randomized, controlled, open label trial to determine whether intensive vs. standard BP control was associated with improved outcomes. Participants were recruited from November 2010 to March 2013 from 102 different clinical sites. Included in the study were patients aged ≥50 years with SBP of 130 mmHg to 180 mmHg, who were also at an increased risk of experiencing a cardiovascular event. Patients could have been taking 0 to 4 BP-lowering medications depending on their baseline SBP. Antihypertensives were administered in accordance with an algorithm developed a priori. The main reasons for exclusion included diabetes or a history of stroke. Patients were assigned to 1 of 2 groups: a standard treatment group with an SBP target of <140 mmHg or an intensive treatment group with an SBP target of <120 mmHg. After randomization, antihypertensive medication regimens were adjusted as needed according to treatment group and protocol. The intended follow-up period was 5 years. The primary endpoint was major cardiovascular events, which was further defined as the composite of first occurrence of myocardial infarction (MI), non-MI acute coronary syndrome (ACS), stroke, acute decompensated HF, or death due to cardiovascular disease (CVD). Individual components of the primary composite endpoint, death from any cause, or the primary composite or death were assessed as secondary endpoints.

A total of 9,361 eligible patients were enrolled in the study: 4,678 in the intensive treatment group and 4,683 in the standard treatment group.[8] The average SBP after 1 year in the intensive treatment group was 121.4 mmHg, compared to 136.2 mmHg in the standard treatment group. With regard to the primary endpoint, a greater number of patients in the standard treatment group compared to the intensive treatment group experienced a primary outcome event (319 vs. 243), and this difference was statistically significant (hazard ratio [HR] 0.75, 95% confidence interval [CI] 0.64-0.89, P<0.001). In terms

of the secondary endpoints, those that were statistically significant included heart failure (HR 0.62, 95% CI 0.45-0.84, P=0.002), death from cardiovascular causes (HR 0.57, 95% CI 0.38-0.85, P=0.005), death from any cause (HR 0.73, 95% CI 0.60-0.90, P=0.003), and primary outcome or death (HR 0.78, 95% CI 0.67-0.90, P<0.001). Notably, the median follow-up for the study was 3.26 years; almost 2 years less than planned. The study was stopped early due to observations of significantly lower rates of cardiovascular outcomes in the intensive treatment group.

The SPRINT research group also assessed comparative safety.[8] A slightly higher number of patients in the intensive treatment group (1,793 or 38.3%) compared to the standard treatment group (1,736 or 37.1%) reported experiencing serious adverse events, but this difference was not statistically significant (HR 1.04, 95% CI not reported, P=0.25). However, in regards to serious adverse events potentially related to the intervention, there was a statistically significant difference between the 2 groups (HR 1.88, P<0.001). In the intensive treatment group, 220 (4.7%) patients experienced serious adverse events possibly or definitely related to the intervention, while 118 (2.5%) patients experienced such events in the standard treatment group. Those occurring more commonly in the intensive treatment group were hypotension, syncope, electrolyte abnormalities, and acute kidney injury or acute renal failure. Serious adverse events were further analyzed in patients ≥75 years of age, with 640 (48.6%) patients in the intensive treatment group and 638 (48.4%) patients in the standard treatment group. This difference was not statistically significant (HR 1.00, 95% CI not reported, P=0.93).

Overall, the SPRINT research group concluded that targeting an SBP of <120 mmHg in adults aged ≥50 years significantly reduces rates of cardiovascular events, as well as death from cardiovascular events or from any cause.[8] Although serious adverse events were reported, the overall difference was not statistically significant. Furthermore, when evaluating patients ≥75 years of age, the difference between the 2 groups in terms of serious adverse events was also not statistically significant. Some limitations to note are the exclusion of patients with diabetes, a history of stroke, or residing in a nursing home or assisted living facility. These exclusion criteria limit the generalizability of results to such populations. Another potential limitation is the fact that average SBP reported after 1 year in the intensive treatment group was slightly above the target SBP of 120 mmHg, which could reflect difficulty in attaining such a low SBP for many patients.

The results of the SPRINT trial were further evaluated in a study by Williamson et al, which specifically investigated the results of a target SBP goal of 120 mmHg in elderly patients ≥75 years of age.[9] The primary endpoint was identical to that of the SPRINT trial. Secondary endpoints differed slightly and were defined as all-cause mortality and a composite of all-cause mortality and the primary endpoints from the SPRINT trial. Further analyses were conducted to evaluate frailty and the effects it might have on the primary outcome and mortality.

A total of 2,636 patients were included in the study: 1,317 patients in the intensive treatment group and 1,319 in the standard treatment group.[9] Baseline characteristics between the 2 groups were noted to be similar, with the exception of frailty and aspirin use. Patients in the intensive treatment group were more frail than those in the standard treatment group (440 or 33.4% vs 375 or 28.4%), and used higher amounts of aspirin (820 or 62.3% vs 675 or 58%). The statistical significance of such differences, however, was not specified. The average SBP over the course of the study was 123.4 mmHg in the intensive treatment group compared to 134.8 mmHg in the standard treatment group, and the average

diastolic blood pressures (DBPs) for the intensive treatment and standard treatment groups were 62 and 67.2 mmHg, respectively.

With regard to the primary endpoint, the results in this population were similar to those of the original SPRINT trial.[9] A greater number of patients in the standard treatment group compared to the intensive treatment group experienced a primary outcome event (148 vs 102), and this difference was statistically significant (HR 0.66, 95% CI 0.51-0.85, P=0.001). As for the secondary endpoint of all-cause mortality, statistically significant lower rates of death were seen in the intensive treatment group (73 deaths) compared to the standard treatment group (107 deaths), (HR 0.67, 95% CI 0.49-0.91, P=0.009). Other statistically significant results included decompensated HF (HR 0.62, 95% CI 0.40-0.95, P=0.03), non-fatal HF (HR 0.63, 95% CI 0.40-0.96, P=0.03), and the composite primary endpoint with all-cause mortality (HR 0.68, 95% CI 0.54-0.84, P<0.001). In terms of favoring intensive treatment in frail patients, the results were statistically significant for the composite outcome of the primary endpoint and all-cause mortality (HR 0.67, 95% CI 0.48-0.95, P=0.02). Serious adverse events were reported by an equal number of patients in the intensive treatment group (637 or 48.4%) and the standard treatment group (637 or 48.3%), but this difference was not statistically significant (HR 0.99, 95% CI 0.89-1.11, P=0.90).

The overall conclusion of this study by Williamson et al was consistent with that of the original SPRINT trial – targeting an SBP of <120 mmHg rather than the standard 140 mmHg in patients aged ≥75 years and those aged ≥50 years, respectively, resulted in significantly lower rates of cardiovascular events, as well as death from cardiovascular events or from any cause.[9]

The Department of Veterans Affairs also evaluated the effects of different BP targets in older adults in a meta-analysis.[10] They included controlled trials involving participants with mean age ≥60 years and diagnosis of HTN at enrollment, comparing lower and higher BP targets (or intensive vs. standard treatment approaches). Trials comparing the effects of different antihypertensives were excluded. Observational studies were included only to evaluate potential harms. Heterogeneity among the studies was assessed using the Cochran chi-square test and I^2 statistic. The investigators formulated several key questions to address differences in outcomes for this population based on the 2 treatment approaches. Selected questions of interest were addressing health outcome effects of differing BP targets and benefits of differing BP targets based on age.

The meta-analysis included 330 articles, of which 21 were randomized controlled trials (RCTs) and 3 were cohort studies.[10] The articles included evaluations on varying SBP targets such as <150 mmHg, <140 mmHg, and <120 mmHg. Findings were inconsistent with some BP target recommendations having stronger supporting evidence than others. Nine RCTs (n=46,450) showed a mortality benefit when targeting BP <150/90 mmHg vs. no target (relative risk [RR] 0.90, 95% CI 0.83-0.98, absolute risk reduction [ARR] 1.64, I^2=0%). This same group of RCTs also showed significant reductions in stroke (RR 0.74, 95% CI 0.65-0.84, ARR 1.13, I^2=0%) and cardiac events (RR 0.77, 95% CI 0.68-0.89, ARR 1.25, I^2=3.2%). Six RCTs (n=41,491) were used to assess target SBP ≤140 mmHg or DBP ≤85 mmHg, and although inconsistent, the overall mortality benefit was non-significant (RR 0.86, 95% CI 0.69-1.06, ARR 0.80, I^2=13.3%). While the mortality benefit was noted to be non-significant, these 6 trials did demonstrate an overall reduction in stroke (RR 0.79, 95% CI 0.59-0.99, ARR 0.49, I^2=16.2%) and a reduction in cardiac events (RR 0.82, 95% CI 0.64-1.00, ARR 0.94, I^2=15.5%) with SBP targets ≤140 mmHg.

The meta-analysis investigators concluded that in general, targeting SBP <150 mmHg in patients ≥60 years of age led to significantly lower rates of mortality, stroke, and cardiac events.[10] While targeting even lower BPs in patients at higher cardiovascular risk may also be beneficial, results are inconsistent among studies, weakening such a recommendation. Although adverse effects were noted across studies, differences between patients aged >75 years and ≤75 years were not significant in regard to unsteadiness, dizziness, or renal failure. One limitation to this analysis is the lack of patients aged >80 years. Although 1 trial solely included patients in this age group, very few patients aged >80 years were included in other trials. Another limitation is the lack of studies evaluating target SBP <120 mmHg. The authors acknowledge that findings supporting this SBP target are largely from 1 study: the SPRINT trial.

In conclusion, it is important to treat HTN, especially in patients aged ≥60 years who are at an increased risk for cardiovascular events, stroke, and death due to high BP. Although guideline recommendations vary in terms of target BP goals in this population, there are data to support lower vs. higher SBP goals. The findings of the SPRINT trial and the sub-analysis, in particular, indicate that intensive BP treatment in older adults may be associated with improvement in cardiovascular outcomes. It is important to note though, that these studies were not without limitations. Based on the available literature, further investigation on the benefits and harms of intensive BP treatment in older adults is necessary.

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