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Hypertension and orthostatic hypotension in older patients

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Outcome-based clinical trials have shown that reducing SBP below or near 150 mmHg in older patients (≥ 65 years of age) reduces stroke, coronary events, and cardiovascular-related mortality [1–4]. In addition, a recent subgroup analysis of the Felodipine Event Reduction (FEVER) trial demonstrates cardiovascular benefit of a lower SBP (mean on-treatment SBP of 139 mmHg) in Chinese hypertensive individuals greater than 65 years of age [5]. Current guidelines are in agreement of a goal blood pressure (BP) less than 140/90 mmHg in individuals with uncomplicated hypertension (HTN), regardless of age [6–8]. Clinicians, however, sometimes remain hesitant to treat older patients to recommended goals due to lack of outcome data targeting a SBP less than 140 mmHg and observational evidence suggesting that low DBP may be associated with an increased risk of death [9].

Orthostatic hypotension, a reduction in SBP by at least 20 mmHg or DBP by at least 10 mmHg within 3 min of standing [10], is another clinical concern during hypertensive treatment of older populations. Decreased baroreflex activation and loss of large artery compliance are thought to be age related, making older patients more susceptible to development of orthostatic hypotension. With the recognition that orthostatic hypotension has been associated with increased falls [11] and fears that intensive antihypertensive therapy can cause orthostatic hypotension, clinicians must weigh the risks and benefits of BP reduction in a population at risk for both HTN-related cardiovascular events and fall-related injuries. A recent consensus statement by the American Heart Association as well as European guidelines highlights this concern by recommending the measurement of standing BPs in the initial assessment of HTN in older patients [7, 8].

Clinical trials have reported a wide prevalence of orthostatic hypotension in older populations. In the 80 years and older patient population of the Hypertension in the Very Elderly Trial (HYVET), 8.3% of the 3845 patients had evidence of orthostatic hypotension at baseline [1]. In the over 60 patient population of the Systolic Hypertension in the Elderly Program (SHEP), 17.3% of the 4736 patients displayed orthostatic hypotension at baseline [12]. In a cross-sectional assessment of 653 home-dwelling Finnish individuals 75 year of age or older, *Hiitola et al.* [13] found that 34% met criteria for orthostatic hypotension.

In this issue of the *Journal of Hypertension*, *Valbusa et al.* [14] report the prevalence of orthostatic hypotension in 994 French and Italian nursing home residents of at least 80 years of age. Associations between orthostatic hypotension and sitting BP, HTN medication use, central pulse pressure, and arterial stiffness were also assessed as part of the PARTAGE (predictive values of blood pressure and arterial stiffness in institutionalized very aged

population) study. Patients with severe dementia (mini-mental state examination ≤ 12) were excluded and those unable to stand (136 patients) did not participate in the orthostatic hypotension portion of the study. The remaining 994 patients underwent mid-morning BP measurements (three seated and one at both 1 and 3 min after standing), pulse wave analysis, and determination of pulse wave velocity (PWV).

The overall prevalence of orthostatic hypotension was 18% (175 of 994 participants). Interestingly, orthostatic hypotension was more often present in individuals with uncontrolled compared with controlled HTN ($146 \pm 23/76 \pm 12$ vs. $136 \pm 21/71 \pm 11$ mmHg, respectively). Overall, individuals with orthostatic hypotension were not receiving more antihypertensive medications than those without orthostatic hypotension (2.2 ± 1.0 vs. 2.2 ± 1.2 medications, respectively). However, individuals with orthostatic hypotension were more likely to be receiving β -blockers, whereas they were less likely to be receiving angiotensin receptor blockers or nitrates. Importantly, there was no difference in diuretic use in individuals with and without orthostatic hypotension. Other comparisons showed a significantly higher central pulse pressure, but no significant difference in arterial stiffness as indexed by PWV between the 175 orthostatic hypotension-positive patients and the 819 orthostatic hypotension-negative patients.

In the current findings, a direct association between orthostatic hypotension and level of SBP was observed. These findings are consistent with the report from Hiitola *et al.*, who found in their study that the percentage of orthostatic hypotension diagnosed by systolic criteria increased with increasing baseline SBP, ranging from 20% with SBP more than 160 mmHg to 7% in individuals with SBP less than 120 mmHg [13]. An optimistic interpretation of these concordant results is that better BP control reduces the likelihood of developing orthostatic hypotension, such that clinicians need not be hesitant to intensively treat BP in older patients because of fear of inducing orthostatic hypotension. It is important to emphasize, however, that the current findings, being observational, support but do not confirm such an interpretation. The concern, of course, as with any observational study, is that the findings are confounded by a selection bias. Accordingly, a more pessimistic interpretation would be that maintaining a lower BP reduces the likelihood of developing orthostatic hypotension, whereas the relative risk of developing orthostatic hypotension with intensive BP lowering is unknown. Of course, distinguishing between these different possibilities will require a prospective assessment, randomizing older individuals to different goal BP levels. Although not designed to primarily address this issue, the Systolic Blood Pressure Interventional Trial (SPRINT) should be able to provide some insight into this issue, as it is randomizing nondiabetic individuals to a goal SBP of less than 140 mmHg or less than 120 mmHg. Although the entry criteria is 50 years of age or older, it will include a large proportion of older individuals.

Valbusa *et al.* found that β -blocker use was associated with increased likelihood of having orthostatic hypotension. From a mechanistic standpoint, one could speculate that the elderly rely more on increased cardiac output mediated by increased heart rate, as opposed to changes in vascular tone to maintain postural BP homeostasis. Hiitola *et al.* [13], however, did not find any difference in β -blocker use in their participants with and without orthostatic hypotension. If the positive association is proven correct, it would provide yet another reason to avoid use of β -blockers in older individuals, unless specifically indicated.

Valbusa *et al.* and Hiitola *et al.* are in agreement in not finding an increased prevalence of orthostatic hypotension in individuals being treated with diuretics. This too has important clinical implications, if confirmed. Probably based largely on presumption, there is a belief among some clinicians that diuretics should be avoided in very old individuals because of risk of volume depletion and associated development of orthostatic hypotension. The

findings of these two studies argue against such a fear. Given the outcome benefit strongly established with use of thiazide diuretics, particularly chlorthalidone, any bias against their use should be seriously considered.

One important clinical consideration not addressed by observational studies is the significance of developing symptomatic vs. asymptomatic orthostatic hypotension. Presumably, it is symptomatic orthostatic hypotension that increases the risk of falling. The clinical relevance of a decrease in SBP by more than 20 mmHg upon standing is unknown in the asymptomatic elderly population. Accordingly, checking orthostatic vital signs appears most relevant when used as a tool to diagnose intravascular volume contraction, dysautonomia, or overmedication in symptomatic patients.

Overall, the findings of Valbusa *et al.* do provide important guidance in the management of HTN in very old patients. It is one of the few studies in which the SBP was below 140 mmHg in the majority of the study population. These controlled patients did not show an increase in orthostatic hypotension and tolerated diuretic use without increased risk of orthostatic hypotension. These results in combination with other similar trials [13] should allay fears of increasing orthostatic hypotension-related falls in older individuals when titrating antihypertensive medications to guideline BPs.

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