

ACUTE GERIATRICS

Reconsidering orthostatic vital signs in older emergency department patients

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A 75-year-old woman with a past medical history of dementia, coronary artery disease, and diabetes presents to your ED after a fall. The patient does not know why she fell and states she is unsure of whether she lost consciousness before or after. She has normal vital signs and her physical exam is normal with no evidence of traumatic injury. An electrocardiogram, chest X-ray and basic blood tests are normal. She is treated with intravenous fluids and admitted to the hospital for a syncope and fall work-up. The admitting general physician asks you whether orthostatic vital signs were obtained. You answer ‘no’ but should the answer be ‘yes’?

Introduction

Medical societies^{1–3} recommend obtaining orthostatic vital sign (OVS) in the evaluation of syncope and falls in all older patients. However, in our experience there are variable views and some misconceptions regarding the role of OVS in the ED, and practice variations in OVS measurement. The present study will review orthostatic hypotension (OH) in older patients, and provide guidance on when to obtain OVS and how to measure, interpret and treat OH in older ED patients presenting with syncope or fall.

Epidemiology and pathophysiology of orthostatic hypotension in older adults

OH is common in the community-dwelling older population with an estimated prevalence rate of 16–20% in individuals over 65 years of age, and 35% in those over 75.^{4,5} Not all of these patients will have symptoms associated with OH. The prevalence of OH is even higher in certain high-risk populations, such as institutionalised older adults and individuals with Parkinson’s disease or diabetes.^{4,5}

In a healthy adult, blood pools in the legs and in the splanchnic and pulmonary circulation when moving from lying to standing,^{5,6} which transiently results in decreased venous blood return to the heart, cardiac output and blood pressure (BP).⁴ These changes activate baroreceptors, triggering a nearly instantaneous increase in sympathetic and decrease in parasympathetic tone, which results in increased vascular resistance, heart rate (HR) and restoration of normal BP.^{4,6} Ageing-related changes (Fig. 1) that result in older adults being susceptible to OH include:

- a reduction in baroreflex-mediated cardioacceleration preventing the typical compensatory increase in HR,
- decreased vasoconstriction,
- reduced water and salt conservation and

- ventricular and vasculature stiffening impeding early diastolic filling.

Orthostatic vital sign measurement

How is orthostatic hypotension defined?

A consensus statement was issued in 2011 defining OH⁷ as a sustained drop in systolic BP (SBP) by ≥ 20 mmHg or diastolic BP ≥ 10 mmHg within 3 min of standing. This definition has been broadly adopted and should be used clinically. However, European syncope guidelines also add standing SBP of < 90 mmHg to this definition of OH.³

How should orthostatic vital signs be measured?

The optimal timing of orthostatic measurements is a source of debate. Many geriatricians advocate delaying the measurement of BP for at least 3, and sometimes 5 or more minutes, after standing, to increase diagnostic yield. Some studies have found delayed (up to 10 min or more after standing) OH occurs almost as frequently as early OH.^{8,9} However, a study in patients aged 44–66¹⁰ found that orthostatic BP measurements at 1 min were associated with the largest mean reduction in SBP and were more predictive of long-term outcomes, including future falls, fractures, syncope and mortality, than measurements at later times. If repeatable in older adults these results would support a simplified ED measurement protocol.

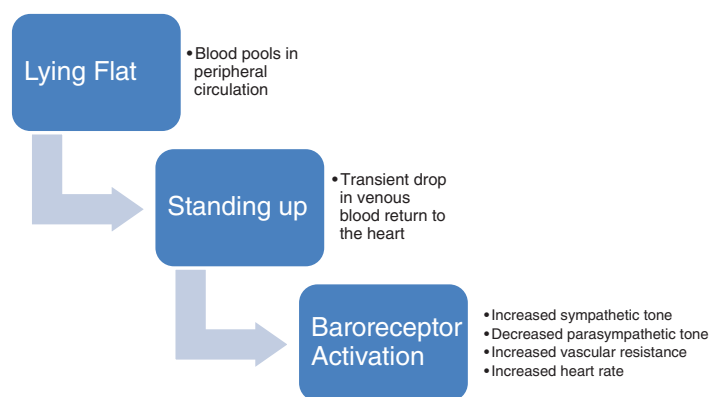
Currently, we recommend that BP be measured after a patient has been

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Normal Response to Position Change



Factors that Occur with Ageing that Degrade Normal Response to Position Change

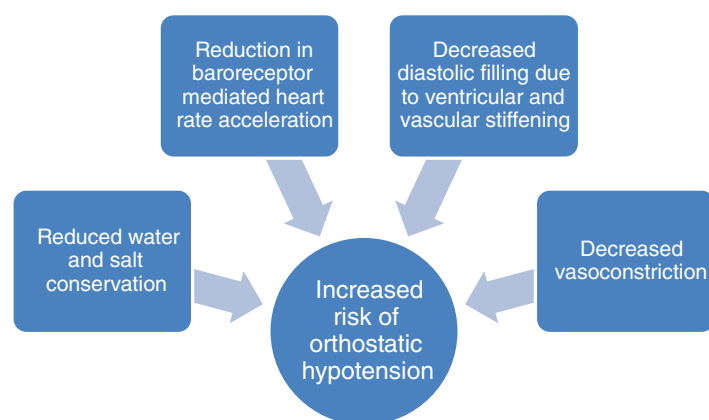


Figure 1. Impact of ageing on the normal physiologic response to position change.

relaxed and supine for 5 min, then again after 1 and 3 min of standing, while asking the patient to report any symptoms.

Should orthostatic heart rate be measured in older adults with syncope and falls?

Another area of confusion is whether, or when, postural HR changes should be recorded. Early ED studies focused on whether OVS could be used to reliably diagnose hypovolemia, and measured both HR and BP responses to posture change.^{11–13} These studies are of questionable relevance to older adults, as they enrolled predominantly young subjects with mild hypovolemia and excluded individuals on

antihypertensive medications.^{13,14} Additionally, in older adults there is a strong negative correlation between age and any orthostatic HR change.^{5,12} Syncope and falls guidelines, therefore, recommend obtaining and interpreting orthostatic BP measurements^{1–3} as the goal is to determine whether a patient had a syncopal event or fall due to brain hypoperfusion from OH.

Orthostatic hypotension and syncope

After the European Society of Cardiology (ESC) released new syncope guidelines, which includes routinely obtaining orthostatic BP measurements in the initial evaluation,³ several studies looked at the impact of

these guidelines in the ED setting. The proportion of syncopal events attributed to OH in these studies varied widely from 5% to 24%.^{15–20} Part of the variation is likely due to the frequency with which OVS were actually obtained, ranging from 14.5%²¹ to 94%^{18,20} of syncope patients. One study found that implementing a decision-making software program to ensure adherence to the ESC guidelines resulted in an increase in the diagnosis of orthostatic syncope from 6% to 10% ($P = 0.002$), lower hospitalisation rates, shorter lengths of stay, fewer tests performed and fewer diagnoses of ‘unexplained syncope’.¹⁵ As a result of the low cost and high yield of orthostatic BP measurements in these studies, some authors have concluded that of all syncope-related diagnostic tests in ED, OVS have the highest yield and are the most cost-effective.^{22,23}

Given the prevalence of OH in older patients, one concern is that routine measurement of OVS may result in misdiagnosing the cause of syncope as OH, missing another more immediately life threatening cause. Indeed, asymptomatic OH has been reported in up to 10% of patients diagnosed with a non-orthostatic aetiology of syncope.^{16,17} Therefore, a diagnosis of orthostatic syncope requires a patient who has a history consistent with OH and have symptoms of OH during measurement. Many studies implementing the ESC guidelines required patients to have both OH and either syncope or presyncopal symptoms at the time standing BP measurements were obtained.^{16–18} Patients diagnosed with OH syncope in the ED had an 18-month mortality rate of 9% – lower than that of cardiac-related syncope but greater than vasovagal syncope.^{17,18}

Orthostatic hypotension and falls

Geriatric ED guidelines²⁴ and guidelines on fall prevention in the elderly² recommend obtaining OVS when evaluating older patients after a fall; however, there is limited ED-based literature on this topic. Many

non-ED-based studies demonstrated an association between OH and prior falls,^{25,26} recurrent falls^{27–29} and future falls,³⁰ and OH has been demonstrated to be associated with an increased risk of death due to injury.³¹ Only two ED-based studies have assessed OH in older patients presenting to the ED after a fall. Neither study actually measured OVS, instead surveying subjects about symptoms attributable to OH and reported that symptoms of OH were associated with an increased risk of recurrent falls.^{32,33} No ED studies have evaluated whether interventions to treat or mitigate OH can prevent future falls and injuries.

Management of orthostatic hypotension

In circumstances where OH is due to acute dehydration, volume resuscitation with intravenous or oral rehydration is clearly indicated. For the much more common scenario of OH in euvolemic older patients, start by looking for any OH-exacerbating medications that could be de-prescribed, such as alpha-blockers, nitrates and diuretics.³⁴ Ask about alcohol use and, in older men, the use of potency medications such as sildenafil.

For patients with chronic OH, simple instructions may prevent serious consequences such as syncope. Advise patients to cross and uncross their legs before standing, rise slowly, eat smaller more frequent meals to reduce splanchnic blood redistribution and use compression stockings.⁵ For refractory OH, refer the patient to a geriatrician or neurologist who can pursue further testing and/or pharmacologic therapy.⁴

Conclusion

Early ED literature focused on OVS in assessment of volume status and found OVS of limited benefit in their young and healthy cohort. Their conclusions have been inappropriately extrapolated to common geriatric conditions seen in the ED including syncope and falls. Subsequent studies of symptomatic OH in older ED patients with syncope demonstrate

high diagnostic yield of OVS. Additional research is needed on the utility of routine OVS in older patients presenting to the ED after a fall, and the clinical impact of ED-based interventions for OH in geriatric falls.

Orthostatic BP measurements should be routine in patients older than 65 years who report dizziness, lightheadedness, presyncope, syncope or unexplained falls. OVS represent an inexpensive, safe assessment that may provide valuable diagnostic information and avoid a costly and potentially burdensome diagnostic evaluation if symptomatic OH is confirmed.

Competing interests

None declared.

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