

Epidemiology of Hypertension in Older Adults



Alexander Chaitoff, MD, MPH^{a,*}, Alexander R. Zheutlin, MD, MS^b

KEYWORDS

• Hypertension • Cardiovascular disease • Older adults • Geriatrics • Epidemiology

KEY POINTS

- There is increasing evidence of benefit to targeting more intensive blood pressure goals in older adults, which are usually defined as ranging from less than 130/80 mm Hg to less than 140/90 mm Hg.
- Less than approximately 10% of adults aged 65 years or older are normotensive without the aid of antihypertensives.
- In adults aged 65 years or older, hypertension has the single largest population attributable fraction of any risk factor for cardiovascular disease.
- A diagnosis of hypertension is associated with multiple psychological and financial consequences.

DEFINING HYPERTENSION AMONG OLDER ADULTS

Describing the epidemiology of hypertension in older adults first requires establishing a common definition of “hypertension” and “older adults.”

The definition of “older adult” is not consistent in medical literature. For example, many epidemiologists use the Medicare eligibility age of 65 years or older as the definition of an older adult. In contrast, the Centers for Disease Control includes adults as young as 50 years of age as “older adults” in the scheme of some of their chronic disease indicator definitions.¹ As such, it is unsurprising to see that “older adult” means different people in different studies. Even if a commonly agreed upon age-cutoff existed, older adults are not a homogenous group and prevalence estimates that generalize to the entire group inherently lack nuance. As such, we will first provide age ranges and descriptors of the samples used to obtain the epidemiologic estimates we present.

^a Division of Pharmacoepidemiology and Pharmacoeconomics, Brigham and Women’s Hospital/Harvard Medical School, Boston, MA, USA; ^b Division of Cardiology, Feinberg School of Medicine, Northwestern University, 676 North St. Clair Street, Arkes Suite 2330, Chicago, IL 60611, USA

* Corresponding author. 2014 Washington Street, 3rd Floor, Newton, MA 02462.

E-mail address: amc231@case.edu

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As for hypertension, the definition has evolved over the years as has our understanding of when to treat hypertension in older adults. Understanding this context is important as not all time periods had clinically agreed upon definitions of hypertension and thus can skew epidemiologic estimates.

Historical Context of Hypertension in Older Adults

In the early twentieth century, contemporary medical opinion was to not treat asymptomatic patients with blood pressures up to (and even over) 180/110 mm Hg regardless of age.² There were several reasons physicians were hesitant to treat patients. Notably, there was limited evidence for the dangers of essential hypertension, which was regularly referred to as “benign” essential hypertension. Moreover, treatments for high blood pressure were scarcely available and often poorly tolerated.³ This combination of the perceived benign nature of hypertension and limited treatment options led the medical community away from classifying hypertension as a serious health risk that required intervention.

However, innovation and evidence generated from the late 1950s through 1970 set the stage for the National High Blood Pressure Education Program and subsequently the first widely circulated guidelines for treating hypertension. Specifically, new, well-tolerated oral medications (notably the thiazide class of diuretics) came to the market and 2 pivotal trials proved that treating hypertension improved clinical outcomes.⁴⁻⁶ This evidence informed Joint National Committee (JNC) I, the first national recommendations for treating patients with diastolic blood pressures greater than 90 mm Hg.⁷

Despite evidence in the 1970s suggesting systolic, versus diastolic, blood pressure more closely associated with coronary heart disease, it was not until JNC V (1992) that the importance of a systolic blood pressure (SBP) goal was codified by guideline recommendations.⁸⁻¹⁰ Through JNC VII (2003), goal blood pressures for older adults (defined as >60 or >65 years of age in different recommendations) generally mirrored those for younger adults.¹¹ Though not a formal guideline, in 2014, the authors of JNC VIII published their recommendations that broke from prior and contemporary guidelines at the time by recommending not initiating pharmacologic treatment in adults aged older than 60 years if their blood pressure was less than 150/90 mm Hg.¹² This was based largely on 2 null trials, one of which may have been underpowered and included relatively healthy older adults and one that did have a significant interaction between age and development of cardiovascular or renal disease.^{13,14} Though JNC VIII was published as a single recommendation, the authors note in the recommendation itself that there were disagreements about this topic on the panel.

Current Recommendations

The current era in hypertension management of older adults is primarily informed by 2 pivotal trials. The Hypertension in the Very Elderly Trial (HYVET), published in 2008, suggested it was beneficial to treat older adults with particularly poor hypertension control (HYVET, for example, included adults aged 80 years or older with SBPs >160 mm Hg).¹⁵ However, the most influential data informing more recent guidelines' stringent hypertension definitions are from the Systolic Blood Pressure Intervention Trial (SPRINT) published in 2015.¹⁶ In this trial, 9361 patients with SBP greater than 130 mm Hg and an increased cardiovascular risk (but not diabetes) were randomized to an intensive (SBP <120 mm Hg) or standard (SBP <140 mm Hg) blood pressure target and followed for a median 3.26 years to assess for cardiovascular events and death. The trial found that those randomized to the intensive target had a 25% and 27% reduction in the hazard of cardiovascular events and all-cause mortality, respectively. A subgroup analysis limited to the 2636 patients who were aged 75 years or

older as well as meta-analyses of multiple trials have subsequently been published showing similar results.^{17,18} While these 2 trials have had the largest influence on guidelines in the United States, there are others, notably the STEP trial performed in China, confirming the benefits of intensive blood pressure control even in older adults.¹⁹

Since 2017, these data have led professional societies to recognize the benefits of more intensive blood pressure targets, which usually range from less than 130/80 mm Hg to less than 140/90 mm Hg. Of note, though evidence continues to be generated on the topics, current guidelines only sparsely comment on isolated diastolic hypertension or J-curve phenomena in older adults, which could be in part due to less clear evidence about how this translates to cardiovascular disease risk in this population.^{20–22}

Given this history, defining hypertension in older adults is somewhat era-specific. To be consistent with the last 20 years of clinical recommendations, quality measures (eg, Healthcare Effectiveness Data and Information Set measures), and epidemiologic practices, we generally use the threshold of 140/90 mm Hg for the purposes of defining hypertension throughout the remainder of this report despite evidence that more intensive control (ie, <130/80 mm Hg) may have additional cardiovascular benefit.

HYPERTENSION IN OLDER ADULTS

Over the life span, there is cumulative exposure to endothelial damaging events, increasing the risk of arterial stiffness, impaired vascular reactivity, and hemodynamic shifts that can further propagate arterial dysfunction.^{23–26} As the likelihood of vascular dysfunction increases with age, the ability to maintain normal blood pressure and variability decreases over time. This change leads to a lower prevalence of ideal blood pressure in older adults with a phenotypic pattern that classically includes a wide pulse pressure with SBP elevations that are relatively greater than diastolic blood pressure elevations.²⁶ Data from National Health and Nutrition Examination Survey (NHANES) demonstrated that between 2011 and 2018, only 11.2% and 5% of adults aged 65 to 74 years and 75 years or older had a blood pressure of less than 120/80 mm Hg.²⁷

Epidemiology of Hypertension in Older Adults

Among adults in the United States, the prevalence of hypertension increases with age. Through much of the twenty-first century, the prevalence of hypertension in older adults has remained relatively consistent (**Fig. 1**). From 2009 and 2012, the prevalence of hypertension (blood pressure >140/90 mm Hg) was 63.9% and 76.8% among adults aged 65 to 74 years and 75 years or older, respectively.²⁸ From 2017 through 2020, the prevalence among adults aged 65 to 74 years and 75 years or older was 64.1% and 74.5%, respectively.²⁸ However, hypertension awareness has fallen among older adults: from 2012 through 2017, fewer adults aged 75 years or older were aware they were hypertensive compared to adults examined between 2009 through 2012 (79.6% vs 86.0%; $P = .019$).²⁸

Despite a greater prevalence of hypertension among older adults compared to younger adults, underdiagnosis remains a common problem faced by older adults and may impact awareness of disease. Among adults without elevated clinic blood pressure, it is estimated that the prevalence of masked hypertension is 28.0% in adults aged 65 years or older.²⁹ Diurnal variation in blood pressure may differentially impact older adults as well. Based on a threshold of greater than 140/90 mm Hg, an estimated 27.2% of adults aged 65 years or older have masked hypertension while asleep only, leaving them vulnerable to a missed diagnosis of hypertension.³⁰

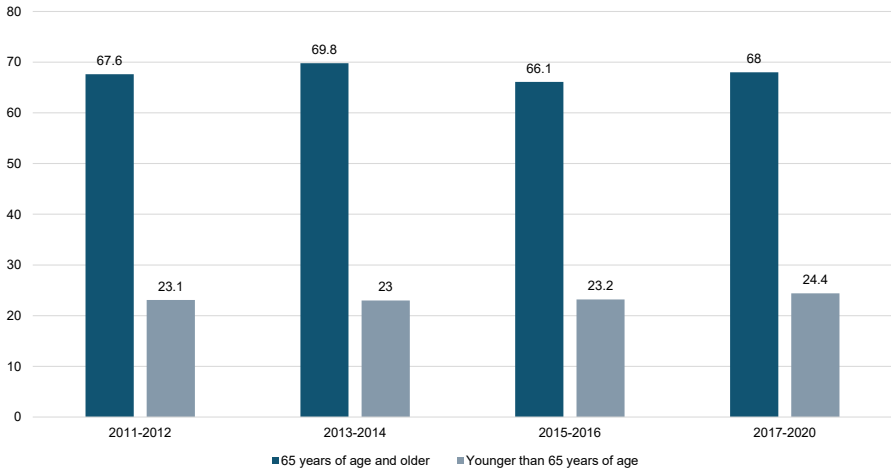


Fig. 1. Prevalence of hypertension among adults aged 65 years or older versus younger than 65 years within the United States. Hypertension is defined as a blood pressure greater than 140/90 mm Hg or self-reported antihypertensive medication use. (Data are available via the Centers for Disease Control and Prevention National Health Examination and Nutrition Survey 2011–2020.)

It is important to note that many estimates of hypertension, including the preceding prevalences, come from national surveys that do not sample institutionalized adults. Selection bias is a concern in all survey research, but survey estimates are at particularly high risk of mischaracterizing certain older adults if they exclude homebound or nursing home residents. Hypertension is common among older adults living in nursing homes. Though estimates vary, studies consistently find at least 50% of nursing home residents have measured blood pressure greater than 140/90 mm Hg and greater than 75% are on antihypertensive medications.^{31–33}

Beyond overall estimates, there are key disparities in hypertension prevalence within the United States among older adults. Hypertension is nearly 5 percentage points more prevalent among women aged 65 years or older than among men in the same age range (70.2% vs 65.4%; threshold of >140/90 mm Hg), which is despite similar awareness rates (women: 60.4% vs men: 57.6%).³⁴ Interestingly, this prevalence gap does narrow when using a threshold of greater than 130/80 mm Hg (women 78.2% vs men: 76.4%).³⁴

Differences in hypertension prevalence among older adults also exist by race and ethnicity. Whereas older (≥ 65 year) non-Hispanic White adults have a hypertension prevalence of 64.5%, non-Hispanic Black, non-Hispanic Asian, and Hispanic adults have prevalences of 87.4%, 79.6%, and 73.8%, respectively. This contrasts with a lower prevalence of hypertension awareness among older non-Hispanic White adults (56.3%), compared to non-Hispanic Black, non-Hispanic Asian, and Hispanic adults (78.2%, 61.4%, and 62.3%, respectively).³⁴

Further, the predisposition to develop hypertension appears to be greater among older adults without a high school degree as well as those with low income and accumulated wealth.³⁵ Just as individual-level socioeconomic factors are being associated with incident hypertension among older adults, so too are neighborhood-level socioeconomic factors. Older adults living in neighborhoods with a lower average socioeconomic status have higher incident hypertension than those living in the neighborhoods

with the highest socioeconomic status.³⁶ Despite increased efforts to reduce the burden of hypertension among older adults, the prevalence of hypertension has remained stable over the past decade with sparse improvements in disparities faced by minoritized older adults with hypertension (Fig. 2).

Blood pressure control among older adults with hypertension remains a challenge. Though the prevalence of older adults who are both aware they have hypertension and are taking an antihypertensive medication is over 95%, only 36.8% of adults aged 75 years or older have a blood pressure less than 140/90 mm Hg overall, and only 47.7% among those are taking an antihypertensive medication.²⁷ Even with a multi-agent strategy to treat hypertension among older adults, blood pressure control can be difficult to achieve, and pooled analysis of participants from the NHANES between 2009 and 2014 found that 47.8% of adults aged 70 years or older met criteria for apparent treatment-resistant hypertension.³⁷ Some of this may be due to inadequate uptitration of antihypertensive regimens: for example, only 12.5% of adults aged 60 years or older with hypertension were appropriately intensified on antihypertensive therapy during clinic visits between 2015 and 2018.³⁸

Frailty and fear of causing older adults harm is often cited as a reason for insufficient blood pressure management for older adults; however, clinical inertia is prevalent among older adults regardless of cognitive or physical function status.^{39,40} Furthermore, post hoc analyses of HYVET and SPRINT demonstrate that frail adults derive significant benefit from appropriate blood pressure control.^{41,42} Moreover, in a subgroup analysis of adults aged 75 years or older from SPRINT, the prevalence of serious adverse events was higher among older adults compared with their younger counterparts but was not actually not different between older adults randomized to an intensive versus standard blood pressure target.¹⁷ As such, frailty and fear of adverse drug events should perhaps have less influence on the epidemiology of antihypertensive use and disease control than it does in the current landscape.

Hypertension is highly prevalent, especially in certain groups, and remains poorly controlled in many older adults. Though elevated blood pressure leads to significant morbidity and mortality, proper diagnosis and treatment of older adults with hypertension remain a key challenge facing a growing aging population.

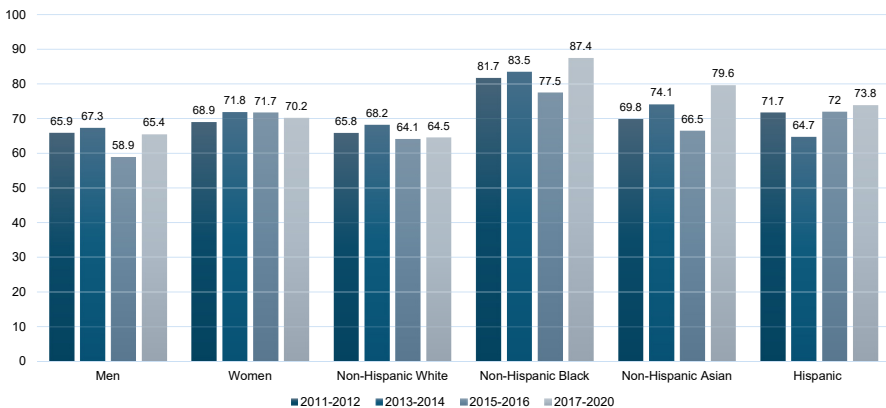


Fig. 2. Prevalence of hypertension among adults aged 65 years or older by sex and race/ethnicity within the United States between 2011 and 2020. Hypertension is defined as a blood pressure greater than 140/90 mm Hg or self-reported antihypertensive medication use. (Data are available via the Centers for Disease Control and Prevention National Health Examination and Nutrition Survey 2011–2020.)

CLINICAL MANIFESTATIONS OF HYPERTENSION IN OLDER ADULTS

Hypertension itself rarely causes symptoms, though it is the leading modifiable risk factor of disease involving multiple organ systems including the heart, brain, and kidneys.^{43,44} Most notably, hypertension is arguably the most prevalent and penetrant risk factor for cardiovascular disease in older adults: one study estimated that, in adults aged greater than 60 years, the population attributable fraction of hypertension for cardiovascular disease was 14.1% (95% confidence interval [CI] 12.7%–15.5%), the highest percentage for any single risk factor.⁴⁵

It is well publicized that cardiovascular disease is the foremost cause of death in the United States.⁴⁶ However, this is actually only true for older adults. Among adults aged 65 years or older, over 525,000 deaths are attributable to cardiovascular disease each year.⁴⁷ Given the primary purpose of diagnosing and treating hypertension is often to reduce the risk of cardiovascular disease, understanding its impact in older adults is paramount.

Epidemiology of Cardiovascular Disease in Older Adults

Much like describing the scope of hypertension in older adults, doing the same for cardiovascular disease is a complicated task for several reasons. First, cardiovascular disease is a broad term. For example, when identifying cause of death, ischemic heart disease is classified as cardiovascular disease while strokes are often classified separately as “cerebrovascular disease,” but in other clinical studies, strokes are often included as cardiovascular events. The variability of conditions that fit under the umbrella term of cardiovascular disease obscures efforts to understand the true burden of disease. This is in addition to the challenges described earlier, which include the issue of treating older adults as a homogenous group and the fact that the definition of “older adult” varies in the literature.

Regardless of which specific diseases and which specific age ranges are included, cardiovascular disease is common among older adults (Fig. 3). Among all adults, the prevalence of heart disease (defined in this case as coronary artery disease, heart failure, or stroke) is 9.9%; however, the prevalence is more than double that among adults aged 65 years or older.⁴⁸ Notably, those with hypertension are more likely to have all forms of heart disease (Fig. 4).

Concerning incidence, one large study of pooled data of several US-based prospective cohorts ($n = 19,630$) assessed rates of new cardiovascular disease among adults aged 55 to 85 years. In 272,124 person-years of follow-up, the incidental proportion of cardiovascular disease (defined more narrowly as including only coronary artery disease or stroke) ranged from 15.3% to 38.6% for women and from 21.5% to 47.7% for men, which depended on other baseline cardiometabolic risk factors.⁴⁹

Aside from traditional cardiometabolic risk factors, it is as important to recognize the relationships between various socioeconomic and demographic factors with cardiovascular disease in older adults. Notably, there are higher rates of cardiovascular mortality in both Black women (rate ratio [RR] 1.32, 95% CI 1.30–1.33) and Black men (RR 1.33, 95% CI 1.32–1.34) compared with their White counterparts, though the differences in cardiovascular mortality rates are smaller in magnitude among older adults than they are among patients aged less than 65 years.⁵⁰ There are several hypotheses for why there is a slight narrowing of disparities after 65 years, but the impact of insurance coverage (ie, qualifying for Medicare) is one that has been proven empirically.⁵¹ Still, Medicare is not a cure-all, and significant disparities in cardiovascular disease morbidity remain among older adults across several socioeconomic axes.^{52,53} For example, in a sample of 128,789 Medicare beneficiaries prior strokes, Black patients

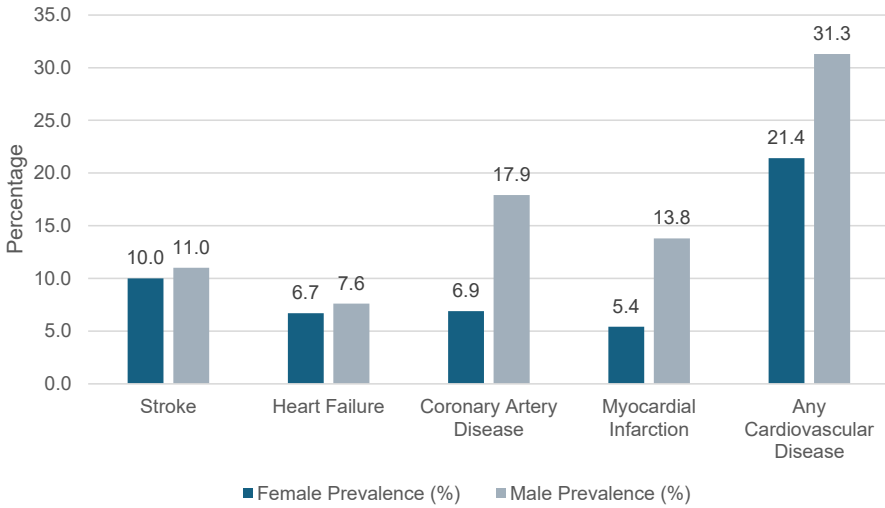


Fig. 3. Prevalence of self-reported cardiovascular disease among adults aged 65 years or older stratified by sex. (Data are available via the Centers for Disease Control and Prevention National Health Examination and Nutrition Survey 2017–2020.)

(compared with White ones) were significantly more likely to have recurrent strokes within 1 year (hazard ratio [HR] 1.36, 95% CI 1.29–1.44).⁵⁴

As dependence on others may increase as adults age, social support and living situations play significant roles in the socioeconomic considerations associated with cardiovascular disease in older adults. Neighborhood deprivation has been

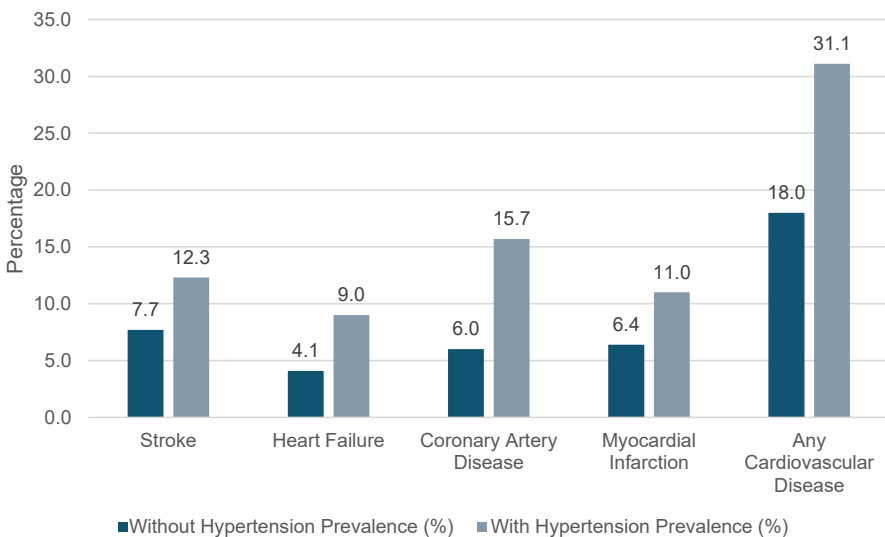


Fig. 4. Prevalence of self-reported cardiovascular disease among adults aged 65 years or older stratified by self-reported hypertensive status. (Data are available via the Centers for Disease Control and Prevention National Health Examination and Nutrition Survey 2017–202.)

shown to be a particularly strong correlate with cardiovascular disease risk in older adults. In a study longitudinally following 288,555 participants aged 51 to 70 years enrolled in the National Institutes of Health-AARP (NIH-AARP) Diet and Health Study, increases in neighborhood deprivation over time were associated with greater cardiovascular mortality. Participants living in neighborhoods that became increasingly deprived over time faced significantly greater risk of cardiovascular mortality compared with those who started in and remained in the neighborhoods with the least deprivation (HR 1.76, 95% CI 1.41–2.19).⁵⁵ Feelings of isolation have similarly been associated with cardiovascular disease, which is concerning given over 33% of adults aged 50 to 80 years report feeling isolated.⁵⁶ In one prospective study of 57,825 community-dwelling women (mean age 79 years), high reported social isolation (vs low) was associated with an 18% increased risk of major cardiovascular events.⁵⁷ There are many potential mechanisms through which the association between socioeconomic factors and cardiovascular disease may be mediated by increased blood pressure, which could include the stress response or the impact of issues like hypertension treatment adherence.^{58,59}

NONCLINICAL IMPACTS OF HYPERTENSION IN OLDER ADULTS

Hypertension impacts patients beyond the clinical manifestations of the downstream diseases it causes. Hypertension and its sequelae can lead to financial toxicity and lost “productivity” time, furthering its deleterious impact in older adults.

Financial Costs Associated with Hypertension

Overall, data from the 2003 to 2014 Medical Expenditure Panel Survey (MEPS) show that patients with hypertension have unadjusted mean health care expenditures of greater than US\$9000 per year, which is more than US\$1900 per year higher than unadjusted mean health care expenditures of individuals without hypertension.⁶⁰ Furthermore, these increased health care costs were seen across multiple areas of hypertension care, from spending on medication to inpatient hospitalizations. While the aforementioned study did not test the interaction between age, hypertension, and costs, it did show that as adults age, they are both more likely to have hypertension and to generate relatively higher health care costs.⁶⁰ Other estimates using MEPS have stratified by age and demonstrated hypertension-specific costs are highest among older adults. In 2010, the yearly mean expenditure was US\$778 per adult aged 65 years or older with approximately 20% of costs being out-of-pocket.⁶¹ It should be noted this latter estimate includes only costs of care directly related to hypertension. When compared with the total health care expenditures patients with hypertension face, this estimate highlights that most hypertension-associated costs are due to downstream disease-states caused by elevated blood pressure. This is especially true now that most antihypertensive medications are generic given drug costs have historically comprised up to 80% of the total direct costs associated with treating hypertension.⁶² As such, it is unsurprising that the financial costs of treating hypertension are now relatively low and in fact continuing to decrease compared with the costs of complications from hypertension.⁶³

From a system and value standpoint, evidence suggests that having intensive blood pressure targets for older adults is cost-effective at the population level (US\$25,417 per quality-adjusted life year). This would make treating hypertension cost-effective even using relatively strict thresholds from the Institute for Clinical Effectiveness Research and accounting for costs associated with clinic visits and laboratory monitoring, drug costs, and costs of treating adverse events.⁶⁴

Burdens Associated with Carrying a Diagnosis of Hypertension

The diagnosis of hypertension has long been described as coming with a “labeling effect” or a psychological anguish of being diagnosed with the disease that can impair quality of life.⁶⁵ One study, which was not limited to older adults (mean age 51.7 years), compared psychological distress in patients who had been labeled as having hypertension versus patients with hypertension but without a diagnosis versus normotensive patients. The authors found higher risk of distress in patients with a hypertension diagnosis, but not those with undiagnosed hypertension, even when adjusted for other health factors.⁶⁶

Medications can also have a profound impact on quality of life. For example, in one survey of Medicare patients, the majority indicated that they would prefer to take fewer medications.⁶⁷ Moreover, in cohorts of older adults, polypharmacy and medication appropriateness are correlated with quality of life scores.^{68,69} Patients with hypertension, which usually requires 2 or more medications in order to obtain optimal control, are at an increased risk of suffering from polypharmacy, which is also correlated with lower likelihood of achieving blood pressure goals.⁷⁰ Fixed-dose combination antihypertensive medication could help alleviate this burden, but appropriate use is less likely among adults aged greater than 60 years compared to adults aged less than 40 years (odds ratio 0.56 95% CI, 0.37–0.83).⁷¹

Of course, while important to consider, this is not an argument against diagnosing or treating patients with hypertension; rather, it speaks to the importance of confirming diagnoses, careful counseling, and appropriate treatment. Interestingly, among adults with hypertension, there is evidence that patients with well-controlled blood pressure actually have better quality of life than their peers with blood pressures not at goal, which has been shown to be true even in older adults.^{72–74} Moreover, estimates extrapolated from the Optimising Treatment for Mild Systolic Hypertension in the Elderly trial suggest it is not cost-effective to deprescribe antihypertensive medications in many older adults, and other research suggests deprescribing interventions more generally have not been shown to improve clinical events or reduce health care utilization.^{75,76}

SUMMARY

Hypertension is more prevalent and associated with more morbidity in older adults than it is in any other age group. As such, it is paramount to accurately diagnose hypertension and use shared decision-making approaches to initiate and titrate effective antihypertensive treatment, which can help prevent multiple diseases and ensure value-concordant care.

CLINICS CARE POINTS

- There are cardiovascular benefits to achieving blood pressure control (<140/90 mm Hg) in older adults, and there may be additional benefits to achieving strict control (<130/80 mm Hg).
- Hypertension is highly prevalent in older adults, and all older adults should be screened for hypertension regardless of frailty.
- Hypertension is arguably the number one contributor to heart disease in older adults, and antihypertensive treatment should be considered for all older adults regardless of frailty.

DISCLOSURE

The authors have nothing to disclose.

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