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Independent Study

Blood pressure Management in the Elderly Patient Population

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# BLOOD PRESSURE MANAGEMENT IN THE ELDERLY PATIENT POPULATION

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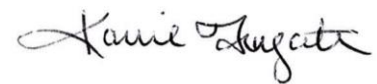
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# BLOOD PRESSURE MANAGEMENT IN THE ELDERLY PATIENT POPULATION

## Abstract

Studies have suggested that adequate treatment for hypertension (HTN) in the elderly population has been shown to significantly reduce the risk of serious cardiovascular events, morbidity, mortality, and improve quality of life. However, treating HTN in the elderly has been controversial resulting in inconsistencies in the current treatment guidelines with no one specific blood pressure value that can be used as a target for treatment in patient populations sixty-years of age and older. In the following case study, an 89-year old female with a history of HTN presented to the clinic with a cough. In attempt to clarify optimal HTN management in the elderly, an online literature search using the University of North Dakota's Harley E. French Library of the Health Sciences. Three databases were searched to obtain evidenced-based research articles and clinical guidelines, which included CINAHL, PubMed, and the Cochrane database. Overall, sixteen articles were evaluated that met inclusion criteria for this literature review. The articles included consisted of systematic reviews, randomized controlled trials, meta-analyses of randomized controlled trials, peer-reviewed articles, as well as several clinical guidelines published within the last five years. All of the literature discussed either HTN diagnosis strategies or HTN treatment strategies and outcomes in the relatively healthy and/ or frail elderly populations. Recommended blood pressure goals to reduce adverse cardiovascular outcomes were variable ranging from systolic blood pressures (SBP) of 130-150 and diastolic blood pressures (DBP) of 80-90. Patient outcomes varied based on patient specific factors such as comorbidities, cardiovascular risk factors, organ damage, and age.

*Keywords:* hypertension, blood pressure, elderly, geriatric, cardiovascular events, frail.

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### **Background**

HTN affects approximately seventy-five million Americans; it is one of the most common chronic health conditions seen in primary care and is the second leading cause of death in the United States (CDC, 2018). Due to the physiologic changes associated with aging, the prevalence of HTN increases with age, affecting an estimated sixty-five percent of people sixty-years of age and older of all races and ethnic groups, with women being affected approximately five percent more than men (Briasoulis, Agarwal, Tousoulis & Stefanadis, 2014; CDC, 2018). Up to ninety percent of patients with blood pressure readings within normal ranges at age fifty-five, will later develop HTN at some point in their lifetime (Briasoulis et al., 2014). Of the seventy-five million Americans currently living with HTN, it is estimated that only half have adequate blood pressure control (CDC, 2018).

Uncontrolled HTN in all populations, especially the elderly, has been identified as a significant risk factor for acute myocardial infarction, congestive heart failure, stroke, renal disease, and is a major contributing factor to cardiovascular disease and mortality (CDC, 2018; Briasoulis et al., 2014; USPSTF, 2017). Often, patients experience no warning signs or symptoms and they are completely unaware they have it, which is why HTN is commonly referred to as the “silent killer.” Routine annual screenings, proper diagnosis, and effective hypertension treatment strategies are imperative in the primary care setting to reduce adverse cardiovascular events and improve patient outcomes in the elderly population.

The patient in the following case study was an 89-year-old female with a history of HTN and a new diagnosis of gastroesophageal reflux disease (GERD). She was otherwise healthy, cognitively intact, independent, and living a life in which she found quality. Her blood pressure

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was 149/88 (SBP/DBP) mm/Hg and she was completely asymptomatic, denying headache, visual disturbances, dizziness, dyspnea, chest pain, or other symptoms indicative of uncontrolled HTN. In planning for her care moving forward, of significant importance would be to consider what defines optimal blood pressure control for the elderly patient population sixty-years of age or older.

### **Case Report**

The patient is an 89-year-old Caucasian female with a history of HTN who presents to the clinic with the chief complaint of a dry hacking cough that has been present for the last three months. She was recently seen at another healthcare facility and diagnosed with bronchitis, for which she was started on Albuterol inhalers and “cough syrups” with no relief. The patient states the cough is nonproductive, worse when lying down to sleep, and is associated with “raw burning” throat pain. She also reports “heartburn” and been self-medicating with TUMs as needed with moderate relief. Her appetite has been average, and she denies nausea or vomiting. However, her sleep is disturbed secondary to coughing. The patient denied fever, chills, rhinorrhea, dyspnea, orthopnea, chest pain/ pressure, palpitations, dizziness, headache, visual disturbances, or lower extremity edema.

The patient denies recent exposure to illness, smoke or second hand smoke, chemicals, or irritants. She quit smoking ten years ago. She has been drinking “one pot of coffee per day and has one or two alcoholic beverages every night before bed,” she does not use illicit drugs. Her past medical history includes HTN; she has been taking 20 mg of Lisinopril every day for “many years” without complications and reports adequate blood pressure control. She denies recent hospitalizations, falls, or other injuries. Her family history includes heart disease, diabetes, and

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colon cancer. Her vital signs were as follows, blood pressure 149/88 mm/Hg; heart rate 75; respiratory rate 16, and temperature 98.9 degrees Fahrenheit.

Upon physical examination the patient was alert and oriented and in no apparent distress. She appeared well kempt and well nourished. The head, neck, ear, and throat exams were unremarkable with the exception of a slightly erythemic pharynx. The cardiovascular, respiratory, and abdominal exams were also unremarkable. The patient was diagnosed with GERD and was started on Prilosec 20 mg once daily. Dietary changes were recommended and the patient was also encouraged to avoid late night eating and head of bed elevation given the presence of nocturnal symptoms.

In regard to the patient's history of HTN and her current blood pressure of 149/88 mm/Hg, the decision was made continue the current drug regime with no changes at this time based on The Eighth Joint National Committee (JNC-8) guideline recommendations and the absence of physiological symptoms of uncontrolled HTN. However, the patient was encouraged to record her blood pressure readings at least one to two times a day (preferably twice a day, once in the morning and once in the evening before bed) for the next month and bring them back to her follow up appointment for review and possible intervention based on one of the several current blood pressure guidelines.

### **Literature Review**

The appropriate treatment of HTN in the primary care setting is essential in all patient populations to reduce the risk of serious irreversible cardiovascular events and renal disease. As patients age they are more likely to have multiple comorbidities, suffer loss of autonomy, and become more frail as multiple physiological systems begin to fail (Zhang, Bei, & Qian, 2016). This increases their risk of sustaining injuries secondary to falls, becoming disabled requiring

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long-term care, and increases their vulnerability to mortality following minor illness (Zhang et al., 2016). When establishing different blood pressure targets, patient specific factors such as comorbidities, cardiovascular risk factors, end organ damage, and age need to be taken into consideration when deciding on a treatment plan (Currie & Delles, 2018). Studies have shown that low blood pressure resulting from the treatment and/ or overtreatment of HTN in the elderly population can lead to increased morbidity and mortality secondary to hypotension, falls, fractures, renal failure, electrolyte imbalances, and Polypharmacy (Currie & Delles, 2018).

This is important to consider for the patient presented in this case study, as she is currently healthy, active, independent, and living a high quality life. Overtreatment of her HTN could potentially lead to any of the previously mentioned complications. This emphasizes the importance of a thorough history and physical exam, annual screening, and a risk versus benefit analysis before determining the safest and most beneficial treatment plan for the elderly patient population. Optimal blood pressure targets for frail elderly patients are not clear and have not been defined in the current guidelines. Nor do they guide treatment regimes for frail patients with multiple comorbidities. It is important for providers to understand that although clinical guidelines provide evidenced-based recommendations, they are not intended replace clinical judgment.

Historically HTN has been classified as normal if the SBP and a DBP are equal to or less than 120/80 mm/Hg (SBP/DBP). Prehypertension is defined as SBP and DBP greater than 120/80 mm/Hg. Stage one HTN, SBP and DBP equal to or greater than 140/90 mm/Hg, and stage two SBP and DBP of equal to or greater than 160/100 mm/Hg (Kjeldsen et al., 2014). These classifications have been agreed upon between the different guidelines until recently. The AHA and ACC have recently redefined HTN classifications. In their guidelines, the term



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prehypertension has been replaced with “elevated blood pressure” with the same systolic and diastolic readings as before (Carey & Whelton, 2018a). Stage one hypertension is now defined as SBP and DBP of greater than or equal to 130/80 mm/Hg, and stage two is now defined as SBP and DBP of greater than or equal to 140/90 mm/Hg (Carey & Whelton, 2018a). A clinical diagnosis of HTN is typically made following at least two, preferably three, elevated blood pressure readings.

Accurately diagnosing HTN is essential to ensure appropriate treatment regimes are initiated (Kjeldsen et al., 2014). As previously mentioned, HTN is typically diagnosed based on at least two or more clinic and/ or ambulatory blood pressure readings. However, clinic blood pressure readings do not always reflect true readings. The United States Preventative Services Task Force (USPSTF) found that ambulatory blood pressure monitoring (ABPM) is the best method for diagnosing HTN due to the various short-term factors that affect blood pressure readings in the clinic setting such as emotions, pain, stress, drugs, physical activity, and “white coat hypertension” (2017).

ABPM involves the use of a twenty-four hour lightweight monitor that uses an oscillometric measurement method that provides superior assessments of actual blood pressure and heart rate readings throughout the day that can be later used to accurately diagnose HTN (Grossman, 2013). ABPM was also shown to be a significant predictor for cardiovascular risk, with nighttime blood pressure readings being the strongest predictor for silent cardiovascular events (Grossman, 2013). ABPM has been widely regarded as “gold standard” in the diagnosis of HTN and although there are algorithms in use by some providers, it is not currently widely used throughout United States (Schwartz, & McManus, 2015).

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When ABPM is not an option, home blood pressure monitoring (HBPM) can be used. This method is inexpensive, convenient, more readily available, and provides measurements over longer periods of time and results in improved patient compliance with HTN treatment regimes (Grossman, 2013). HBPM involves having the patient use a validated automated blood pressure monitor to record blood pressure readings taken throughout the day. These readings are then documented in a log that can later be evaluated by their provider. The use of HBPM has also shown to be more closely related to target organ damage and adverse cardiovascular outcomes (Grossman, 2013).

HBPM does not have the same specificity or sensitivity as ABPM and should not be used as a single test to diagnose HTN, however HBPM is particularly helpful for the long-term management of patients currently receiving HTN treatments (Grossman, 2013). In a randomized control study performed by Tzourio, Hanon, Godin, Soumaré, & Dufouil (2017) HBPM sessions performed by the elderly population every three months, without medication titration protocols or co-interventions, could potentially lead to reductions in SBP over longer periods of time when compared to annual monitoring. HBPM has also been shown to contribute to self- management of HTN in the elderly population (Tzourio et al., 2017). The most commonly used method used to diagnosis HTN is HBPM in combination with clinical readings.

For the patient in this case study, ABPM vs. HBPM is an important consideration especially since the blood pressure reading on the day of her exam was an isolated reading that could have been altered due to one or more of the several short-term factors mentioned above. Having the patient monitor her blood pressure readings at home with plans to follow up is one of the best ways to ensure accurate blood pressure readings and optimal control without overtreatment that could potentially lead to adverse side effects. HBPM would also be

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appropriate given the fact she had already been previously diagnosed with HTN and it encourages self-management.

Currently there are several guidelines available that aid in the decision making process when treating patients with hypertension. Several of the most commonly used in clinical practice include The Eighth Joint National Committee (JNC-8), The American College of Cardiology (ACC), The American Heart Association (AHA), The American College of Physicians (ACP), and The American Academy of Family Physicians (AAFP). However, not all guidelines provide consistent recommendations in regard to blood pressure management in the elderly population (age sixty years and older) and many of them lack studies that specifically address patients in this age group and those with comorbidities. The importance of incorporating lifestyle and behavioral modifications is one area of consistency within these guidelines and should be recommended for every patient presenting with hypertension. In planning for the care of hypertensive elderly patients, it is important to consider that although utilizing evidenced-based practice and/ or guidelines has been shown to improve patient outcomes, safety, and quality of life, it must not replace the clinical judgment of the healthcare provider. The patient specific factors previously mentioned must be considered when implementing hypertension treatment plans.

The JNC-8 performed systematic reviews on randomized control trials to create their guideline for the management of hypertension. The guideline offers grade A recommendations (strong recommendation) that state patients in the general public who are sixty years and older, should be treated to maintain a blood pressure of 150/90 mm/Hg or less to reduce the risk of heart failure, stroke, and coronary artery disease (James et al., 2014). Lowering the systolic blood pressure in the elderly patient population to lower than 140 mm/Hg provides no added

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benefit in terms of risk reduction when compared to systolic blood pressures maintained between 140-160 mm/Hg (James et al., 2014).

Patients sixty years of age and older who are receiving pharmacological treatment for hypertension and achieve blood pressure readings lower than 150/90 mm/Hg (i.e 130/75 mm/Hg), and are tolerating the treatment with no adverse effects on their health or quality of life, do not need to have their treatment regime adjusted so a higher blood pressure can be attained (James et al., 2014). The JNC-8 also recommends that all patients of any age in the general population with diabetes and/or renal disease, be initiated or maintained on pharmacological treatment to achieve adequate blood pressure control with a goal of 140/80 mm/Hg or lower (James et al., 2014). The patient presented in this case study had an isolated blood pressure reading of 149/88 mm/Hg; she did not have additional comorbidities such as diabetes or renal disease, which supports the decision to continue her current drug regime.

With the new JNC-8 guidelines and the more relaxed blood pressure targets for adults in the United States, it is estimated that there will be a reduction of almost six million patients that will no longer be considered hypertensive and will no longer require pharmacological intervention (Navar-Boggan, Pencina, Williams, Sniderman, & Peterson, 2014). It is estimated that approximately twenty-eight million adult Americans are still classified as hypertensive, still will not be reaching their blood pressure target goals (with the majorly affected being patients sixty years or older), while thirteen million adult Americans who were previously not meeting their blood pressure target goals, will now be meeting their goals (Navar-Boggan et al., 2014). For patients with high cardiovascular risk factors receiving intensified treatment, many may be eligible for a lower intensity treatment or possibly no treatment at all (Navar-Boggan et al., 2014).

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The Hypertension in the Very Elderly Trial (HYVET) was one of the very prominent studies performed during the time the JNC-8 recommendations were presented. This study is very applicable to the patient presented in the case study due to her age. The HYVET study was performed in attempt to clarify the balance of risk verses benefit in hypertensive patient's aged eighty years or older receiving treatment. Age related elevations in systolic blood pressure are common in elderly patients. Most patients seventy-five years of age or older have a five year absolute cardiovascular risk of at least fifteen percent, and patients with an established history of cardiovascular disease are at very high risk of having further events that could be fatal (Beckett et al., 2014).

For all patients eighty years of age or older with a sustained SBP of 160 or higher, especially in the presence of cardiovascular disease, pharmacologic intervention should be initiated with a goal systolic blood pressure of 150 mm/Hg (Beckett et al., 2014). Evidence from this study did not support SBP control to less than 150 mm/Hg, nor did it identify any other studies that evaluated patients eighty years or older with SBP's ranging from 140-160 (Beckett et al., 2014). In addition, patients with higher systolic blood pressures at baseline had the greatest benefit and patients that received intervention earlier had fewer cardiovascular events (Beckett et al., 2014). They also concluded that additional research is needed for this patient population.

In the systematic review performed by Briasoulis et al., (2013) evaluating the effects of HTN treatment on patients sixty five years of age and older also found that treating HTN with a blood pressure target of 150/80 mm/Hg was effective in reducing the risk of cardiovascular mortality, stroke, and heart failure. The study also concluded that control over the SBP rather than DBP had greater significance in terms of cardiovascular risk reduction (Briasoulis et al., 2013). These results are comparable to those of the HYVET study previously mentioned.

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Zhang et al., (2016) performed a systematic review and meta-analysis that investigated the relationship between high blood pressure and cardiovascular outcomes in the frail elderly and found that treating blood pressures over 140/90 mm/Hg may cause harm unless a strict evaluation for frailty was conducted before treatment is started. More than fifty percent of elderly patients have three or more comorbidities that result in different cumulative effects on the patient, higher blood pressures may be needed to maintain organ perfusion and reduce hypotensive episodes (Zhang et al., 2016). Overall, their findings suggest that HTN in frail elderly adults lowers the risk of overall mortality for this patient population and accurately identifying these patients is key to the development of optimal HTN treatment strategies (Zhang et al., 2016). Due to the lack of studies in this growing patient population, they also recommend further clinical research.

In contrast, the SPRINT study, which is a randomized controlled study, found that lowering systolic blood pressure targets to less than 120 mm/Hg in all patient populations at high risk for cardiovascular events, without diabetes, especially those seventy-five years or older, as compared to with less than 140 mm/Hg, resulted in lower rates of fatal and nonfatal cardiovascular events (Pfeffer et al., 2016). The SPRINT study did not address comorbidities nor did they assess the frailty of the elderly patient population in their study, which further supports the need for this distinct elderly population to be treated differently with thorough risk versus benefit assessments prior to the initiation of treatment (Zhang et al., 2016). Another important finding in the SPRINT trial was that only about fifty percent of hypertensive patients being treated with a blood pressure goal of 140/90 mm/Hg or less actually achieved this goal (Pfeffer et al., 2016). This suggests that optimal control can be very challenging and would require increased medication usage and clinic visits (Pfeffer et al., 2016).

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In another systematic review performed by Kirk, Allsbrook, Hansell, & Mann, (2017) that assessed HTN treatment strategies and outcomes in elderly adults found that optimal blood pressure management continues to be controversial. This study concluded that HTN is an important modifiable risk factor and found evidence to support treating blood pressures to tight goals of at least 140/89 mm/Hg or less (if tolerated) improves cardiovascular outcomes and reduces mortality risks in the elderly population (Kirk et al., 2017). They also confirm that evidence to determine optimal blood pressure control in the frail elderly population is lacking and more research is needed (Kirk et al., 2017).

The ACP and AAFP also joined efforts when developing their guideline for the pharmacological treatment of hypertension in adults aged sixty years of age or older with recommendations similar to those of the JNC-8. Their recommendations are based on systematic reviews of randomized controlled trials and observational studies (Qaseem et al., 2017). Throughout the guideline, the ACP and AAFP stress the importance of taking a collaborative approach with elderly patients by having frequent discussions regarding the benefits and harms associated with the treatment of hypertension when establishing treatment goals (Qaseem et al., 2017). The ACP and AAFP recommend that for all patients sixty years or older, pharmacological intervention be initiated on all patients with a blood pressure of 150/90 mm/Hg or higher, with a goal of maintaining blood pressures of 150/90 mm/Hg or less to reduce the risk of cardiovascular events and possibly death (Qaseem et al., 2017).

The ACP and AAFP also recommend that for patients sixty years or older with a history of transient ischemic attack or stroke, a more intense pharmacologic regime is needed to maintain a SBP of less than 140 mm/Hg to reduce the risk of recurrent cerebral vascular events (Qaseem et al., 2017). Also, for all elderly patients with an increased cardiovascular risk, which

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includes patients with one or more of the following; diabetes, kidney disease, known vascular disease, obesity, dyslipidemia, and/ or metabolic syndrome, a treatment goal of a SBP of 140 mm/Hg or less significantly decreases all cause mortality (Qaseem et al., 2017).

The ACC and AHA partnered as well to develop their most recent, and most stringent, hypertension management guideline. Following a structured literature review including systematic reviews and meta-analyses, they not only redefined blood pressure thresholds, they also redefined hypertension classification (as mentioned above), and they recommend that an atherosclerotic cardiovascular disease (ASCVD) risk assessment be done on all hypertensive patients using as assessment tool such as the Framingham risk calculator (Carey & Whelton, 2018b). The ACC and AHA feel strongly that hypertension is a major contributor to the premature disability and institutionalization of many elderly patients (Carey & Whelton, 2018b).

Per the ACC and AHA guidelines, providers can safely assume that all patients age sixty-five or older have a high risk of having ASCVD, which places them in a high-risk category warranting the initiation of antihypertensive treatment with a SBP goal of 130 mm/Hg or less, provided they are non-institutionalized, living in the community, and ambulatory (Carey & Whelton, 2018b). For institutionalized geriatric patients, or those with limited life expectancy and with multiple high-burden comorbidities, careful titration and monitoring is needed as most clinical trials have excluded these types patients (Carey & Whelton, 2018b). Also, the ACC and AHA recommend that for the elderly frail patient population, the intensity of blood pressure control should be based on collaboration, the patient's preference, and the provider's clinical judgment (Carey & Whelton, 2018).

For all adult patients with coexisting diabetes or renal disease, the ACC and AHA recommend “for the sake of convenience” practitioners assume all patients have a high risk of



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having ASCVD, which automatically places them in the high-risk category and in need of intensified treatment (Carey & Whelton, 2018b). Antihypertensive medications should be initiated in these patients when their blood pressure is greater than 130/80 mm/Hg with a goal of 130/80 mm/Hg or less (Carey & Whelton, 2018b). Although the ACC and AHA did not approve of the JNC-8 recommendations for less stringent blood pressure control in the elderly population, they do acknowledge that initiating one or more antihypertensive medications in this patient population requires extreme caution and close monitoring for adverse affects (Carey & Whelton, 2018b). Following these guideline recommendations for the patient presented in the case study would have possibly required a dose adjustment in her Lisinopril or the addition of a second antihypertensive drug, which could potentially increase her risk of adverse effects.

With the application of the new guidelines from the ACC and AHA, millions of Americans that were otherwise considered healthy will now have a diagnosis of hypertension. It is estimated that thirty-one million Americans will now be considered hypertensive, with four million requiring pharmacological intervention, and approximately twenty-nine million needing intensified treatment regimes (Brunström, Carlberg, & Lindholm, 2018). The benefits of tighter blood pressure control remain questionable. There were no identified cardiovascular benefits associated with these new recommendations and problems are likely to arise secondary to the increase in cost associated with additional patients requiring hypertension treatments and the potential increase in serious side effects for the elderly population (Brunström et al., 2018).

### Learning Points

- Uncontrolled HTN the elderly patient population has been identified as a significant risk factor for acute myocardial infarction, congestive heart failure, stroke, renal disease, and is a major contributing factor to cardiovascular disease and mortality.
- Accurate diagnosis of HTN is imperative for optimal management. Ambulatory blood pressure monitoring (ABPM) is considered “gold standard” for the initial diagnoses of hypertension but is not widely available. HBPM is an alternative choice but should be used in conjunction with clinical assessments. HBPM has also been shown to be highly effective for ongoing BP assessments in those previously diagnosed with HTN and it fosters self-sufficiency.
- When developing HTN treatment plans, the unique clinical characteristics and needs of each individual patient must be factored in to minimize adverse affects associated with HTN treatment strategies. These factors include comorbidities, cardiovascular risk factors, end organ damage, and age. The patient’s desires/ treatment goals must also be considered.
- For elderly hypertensive patients, a frailty assessment must be done to identify underlying comorbidities and how these comorbidities may impact decisions regarding HTN treatment strategies.
- Current guidelines do not factor in patient specific factors such as frailty, comorbidities, level of independence, or quality of life. Treatment strategies for elderly hypertensive patients should include the use of clinical guidelines that help guide care with evidenced-based recommendations but they should not replace clinical judgment.

### **Conclusion**

Determining appropriate blood pressure treatment regimes for elderly patients aged sixty years and older has been, and continues to be controversial. The current guidelines offer evidenced-based recommendations but they do not offer consistent blood pressure target goals, nor do they guide care based on pre-existing comorbidities commonly found in the elderly patient population and they are not intended to replace the clinical judgment of the provider. Many factors must be considered when selecting blood pressure targets for this patient population and all of these factors, in addition to the patient's desires/ treatment goals, should be taken into consideration when developing a treatment regime. Also, very close follow-up is imperative with the elderly population as adverse affects are more common and have been shown to lead to higher morbidity and mortality rates. For the patient presented in this case study, the decision was made to follow the JNC-8 guideline. She was a rather straightforward case with no comorbidities such as diabetes, renal disease, and she did not have a history of cardiovascular disease. Obtaining a blood pressure record via HBPM, in conjunction with evidenced-based guidelines, and sound clinical judgment, is the safest most effective way to manage her blood pressure in the future.

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