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Essential Hypertension in Adults

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Introduction

The author chose to write about hypertension because she takes care of patients and family members with hypertension on a frequent basis, and is likely to face the challenge of managing patients with hypertension (HTN) in her future role as a nurse practitioner due to the high prevalence of HTN among men and women. Non-Hispanic black adults have the highest prevalence (42.1%) compared with white (28.0%), Hispanic (26.0%), and Asian Americans (24.7%). In 2010, high blood pressure contributed to the death of more than 362,000 Americans. Hypertension is defined as a systolic blood pressure (SBP) of 140 mmHg or higher and/or a diastolic blood pressure (DBP) of 90 mmHg or higher. Hypertension is often referred to as a "silent killer" because many people with the disease are asymptomatic.

How to Take Blood Pressure

- Wait at least 5 minutes between entry into the office and blood pressure measurement (Siu, 2015, p. 779).
- Use an appropriately sized arm cuff, and placed the patient's arm at the level of the right atrium during measurement (Siu, 2015, p. 779).
- Measure blood pressure in both arms to check for any difference at least once; if a difference is noted then any subsequent readings should be taken from the arm with the higher reading (Potts, 2014, p. 148).
- Understand that systolic blood pressure is the pressure in the artery during systole or when the heart is contracting; diastolic blood pressure is the pressure in the arteries during diastole or when the heart is relaxing and filling with blood (Potts, 2014, p. 146).
- Multiple measurements over time have better positive predictive value for hypertension than a single measurement (Siu, 2015, p. 779).
- In addition to office blood pressure measurement, ambulatory blood pressure measurement (ABPM) and home blood pressure measurement (HBPM) may be used to confirm a diagnosis of hypertension after initial screening (Siu, 2015, p. 780).

Signs and Symptoms

- Hypertension is called the "silent killer" because it has no warning signs or symptoms (Centers for Disease Control and Prevention [CDC], 2014).
- In rare cases, HTN can cause symptoms like headaches or vomiting (CDC, 2014).
- HTN is often asymptomatic and may remain unrecognized if at-risk patients are not screened (Klemas & Dowling, 2015, p. 18).
- Blood pressure (BP) is the major indicator of essential hypertension (see figure 1), so it is important to know how to take blood pressure.

Risk Factors for Hypertension

According to Klemas and Dowling (2015, p. 18), the risk factors for HTN include:

- Diabetes.
- Advanced age.
- Being African American.
- Smoking tobacco.
- Excess alcohol consumption.
- Sedentary lifestyle.
- Consumption of diet high in sodium and low in potassium.

Pathophysiology of Essential Hypertension (See figure 2).

- The pathogenesis of HTN is multifactorial and develops from a complex interaction of genetic and environmental factors (Majumder & Wu, 2015, p. 258).
- Endothelial dysfunction, enhanced activation of sympathetic nervous system (CNS), and structural abnormalities in resistance vessels play critical roles in the development and progression of HTN, but physiologically, the renin-angiotensin system (RAS) is one of the important pathways for regulating blood pressure and vascular tone in the human body (Majumder & Wu, 2015, p. 258).
- The RAS pathway is initiated in the kidney with the proteolytic conversion of angiotensinogen (produced in the liver) to angiotensin I (Ang I) by renin (produced in the kidney); Ang I is an inactive decapeptide which can be converted into a vasoconstrictive octapeptide, Ang II, by the action of angiotensin converting enzyme (Majumder & Wu, 2015, p. 258).
- Effects of Ang II (Bostock-Cox, 2013, p. 534) include: Increased sympathetic activity; tubular sodium (Na+) and chloride (Cl-) reabsorption and potassium (K+) excretion (water retention); aldosterone secretion (increasing water [H₂O] retention); arterial vasoconstriction (increase in blood pressure).
- The actions propagated by Ang II result in an increased in blood pressure.
- Though RAS is widespread in the body, the main source of renin is the juxtaglomerular apparatus of the kidney, while that of angiotensin converting enzyme (ACE) is abundantly present [on] cell surface of endothelial cells, especially in the lungs (Majumder & Wu, 2015, p. 259).
- The major stimuli for secretion of renin from the juxtaglomerular apparatus include glomerular hypoperfusion, reduced sodium intake, and increased activity of the sympathetic nervous system (Simões e Silva & Flynn, 2012, p. 1836).

Renin-angiotensin-aldosterone system

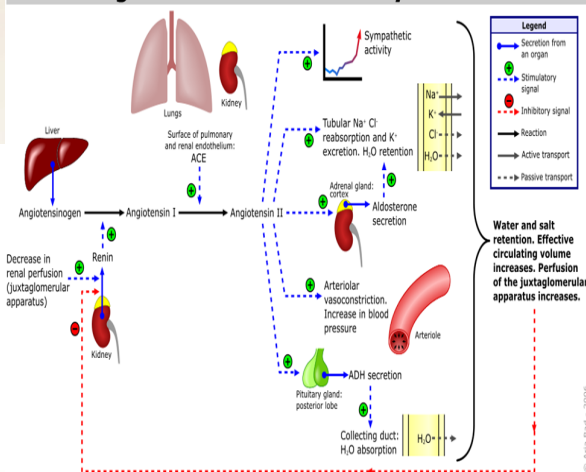


Figure 2: Pathophysiology of essential hypertension.

Significance of Pathophysiology

- Initiation of medication is based on the level of HTN and the number of risk factors that are present along with any evidence of damage to organs, such as the heart or kidneys (Potts, 2014, p. 147).
- Pathological outcomes induced by angiotensin II include myocardial infarction (MI), heart failure, stroke, and renal failure (Ferrari, 2013, p. 3).
- HTN is the second leading cause of end-stage renal disease (ESRD) after diabetes (Mennuni et al., 2014, p. 74).
- Research shows salt sensitivity is disproportionately manifest in African Americans; healthy African Americans have been shown to have more, not less, activation of the RAS system than Whites; circulating aldosterone levels are also higher in African Americans than in Whites (Flack, Nasser, & Levy, 2011, p. 84).
- Understanding the pathophysiology will aid in the initiation of pharmacological therapy in the management of HTN (see figure 3).
- In people under the age of 55, ACE inhibitors—or angiotensin receptor blockers (ARBs) if ACE inhibitors cause coughing—are used as first-line drugs (Bostock-Cox, 2013, p. 534).
- In people over 55, calcium-channel blockers (CCBs) such as amlodipine or felodipine are recommended as first-line treatment (Bostock-Cox, 2013, p. 534).
- Untreated HTN leads to progressive end-organ damage such as the eye (hypertensive retinopathy), kidneys (end-stage renal failure), brain (cerebrovascular accident), and heart (heart failure) (Nadella & Howell, 2015, p. 276).
- Understanding adverse drug reactions (ADRs) can lead to a better patient outcome. For example, ACE inhibitors may lead to an increased amount of circulating bradykinin, leading to coughing; if this happens, angiotensin receptor blockers (ARBs) may be used, as these do not affect bradykinin levels (Bostock-Cox, 2013, p. 534).

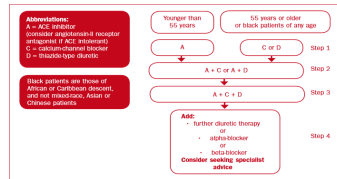


Figure 3 (Bostock-Cox, 2013, p. 533).

Nursing Implications

- Measure BP and ensure that blood pressure is within normal ranges, educate patients to modify behaviors related to diet, physical activity, smoking, weight loss, stress, alcohol consumption, and medication compliance.
- The currently recommended dietary strategies to lower BP include reducing salt intake, increasing potassium intake, weight loss, moderation of alcohol consumption, and adoption of balanced and "heart-friendly" dietary patterns, such as the well-established Dietary Approaches to Stop Hypertension (DASH) diet (Koliaki & Katsilambros, 2013, p. 402) – See figure 4.
- When taking BP, nurses need to understand and educate patients about possible short-term factors that may affect BP readings such as physical activity, drugs (including caffeine and nicotine), pain, stress, and emotions (Siu, 2015, p. 780).
- Nurses should pay close attention to "white coat syndrome". Isolated clinic HTN in the medical setting and in the presence of medical personnel (known as "white coat" hypertension) is well documented (Siu, 2015, p. 780).
- U.S. Preventive Services Task Force (USPSTF) recommends confirmation outside of the clinical setting before a diagnosis of HTN is made and treatment is started (Siu, 2015, p. 781).
- Given the higher incidence of HTN in populations with risk factors, annual screening may be warranted for persons aged 40 years or older, African Americans of any age, and persons who are overweight or obese (Siu, 2015, p. 783).

The DASH Food Pyramid



Figure 4: DASH food pyramid.

Conclusion

The diagnosis of HTN is complicated by the "white coat" phenomenon; therefore, ABPM and HBPM should be considered before a definitive diagnosis is made. Though pharmacological treatment is key to lowering BP by altering peripheral vascular resistance and cardiac output, a holistic approach will require both the use of pharmacological intervention and lifestyle modification. Healthcare providers need to work in partnership with their patients to accomplish set goals. Hypertension often lasts a lifetime, therefore, keeping BP under control can lower the risk for heart disease, stroke and kidney failure.

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Category	Systolic (mmHg)	Diastolic (mmHg)
Optimal	<120 and <80	<80
Normal	120-129 and/or 80-84	80-84
High normal	130-139 and/or 85-89	85-89
Grade 1 hypertension	140-159 and/or 90-99	90-99
Grade 2 hypertension	160-179 and/or 100-109	100-109
Grade 3 hypertension	≥180 and/or ≥110	≥110
Isolated systolic hypertension	≥140 and <90	<90

*The blood pressure category is defined by the highest level of blood pressure, whether systolic or diastolic. Isolated systolic hypertension should be graded 1, 2 or 3 according to systolic blood pressure values in the ranges indicated

Figure 1 (Bostock-Cox, 2013, p. 532): Classification of blood pressure for adults.

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