government are key to moving this field forward.[8] Ongoing education along with systemwide strategies to improve timely uptake of evidence-informed clinical practice guidelines should be prioritized. NP

## REFERENCES


1. Flynn JT, Kaelber DC, Baker-Smith CM, et al. Clinical practice guideline for screening and management of high blood pressure in children and adolescents. *Pediatrics*. 2017;140(3):e20171904.
2. Gupta-Malhotra M, Hashmi SS, Poffenbarger T, McNiece-Redwine K. Left ventricular hypertrophy phenotype in childhood-onset essential hypertension. *J Clin Hypertens (Greenwich)*. 2016;18(5):449-455.
3. Yang L, Yang L, Zhang Y, Xi B. Prevalence of target organ damage in Chinese hypertensive children and adolescents. *Front Pediatr*. 2018;6:333.
4. Leiba A, Twig G, Levine H, et al. Hypertension in late adolescence and cardiovascular mortality in midlife: a cohort study of 2.3 million 16- to 19-year-old examinees. *Pediatr Nephrol*. 2016;31(3):485-492.
5. Matossian D. Pediatric hypertension. *Pediatr Ann*. 2018;47(12):e499-e503.
6. Hanevold CD, Flynn JT. Hypertension in children: diagnosis and treatment. In: *Hypertension: A Companion to Braunwald's Heart Disease E-Book*. 3rd ed. Philadelphia, PA: Elsevier; 2018.
7. Song P, Zhang Y, Yu J, et al. Global prevalence of hypertension in children: a systematic review and meta-analysis. *JAMA Pediatr*. 2019:1-10.
8. Taylor-Zapata P, Baker-Smith CM, Burckart G, et al. Research gaps in primary pediatric hypertension. *Pediatrics*. 2019;143(5):e20183517.
9. Guzman-Limon M, Samuels J. Pediatric hypertension: diagnosis, evaluation, and treatment. *Pediatr Clin North Am*. 2019;66(1):45-57.
10. Vieux R, Gerard M, Roussel A, et al. Kidneys in 5-year-old preterm-born children: a longitudinal cohort monitoring of renal function. *Pediatr Res*. 2017;82(6):979-985.
11. Batisky DL. Obesity hypertension: clinical aspects. In: Flynn J, Ingelfinger JR, Redwine K, eds. *Pediatric Hypertension*. 4th ed. Switzerland: Springer International Publishing; 2017:1-19.
12. Parker ED, Sinaiko AR, Kharbanda EO, et al. Change in weight status and development of hypertension. *Pediatrics*. 2016;137(3):e20151662.
13. Gupta-Malhotra M, Banker A, Shete S, et al. Essential hypertension vs. secondary hypertension among children. *Am J Hypertens*. 2015;28(1):73-80.
14. American Academy of Pediatrics. Recommendations for preventive pediatric health care. Bright Futures. 2019. www.aap.org/en-us/documents/periodicity_schedule.pdf.
15. Hanevold CD. White coat hypertension in children and adolescents. *Hypertension*. 2019;73(1):24-30.
16. Ahern D, Dixon E. Pediatric hypertension: a growing problem. *Prim Care*. 2015;42(1):143-150.
17. Kelly RK, Thomson R, Smith KJ, Dwyer T, Venn A, Magnussen CG. Factors affecting tracking of blood pressure from childhood to adulthood: the childhood determinants of adult health study. *J Pediatr*. 2015;167(6):1422-1428.e2.
18. Centers for Disease Control and Prevention. Physical activity guidelines for school-aged children and adolescents. 2018. www.cdc.gov/healthyschools/physicalactivity/guidelines.htm.
19. Waldron FA, Benenson I, Jones-Dillon SA, et al. Prevalence and risk factors for hypertensive crisis in a predominantly African American inner-city community. *Blood Press*. 2019;28(2):114-123.
20. Husain K, Ansari RA, Ferder L. Alcohol-induced hypertension: mechanism and prevention. *World J Cardiol*. 2014;6(5):245-252.
21. Burrello J, Erhardt EM, Saint-Hilary G, et al. Pharmacological treatment of arterial hypertension in children and adolescents: a network meta-analysis. *Hypertension*. 2018;72(2):306-313.
22. Gartenmann AC, Fossali E, von Vigier RO, et al. Better renoprotective effect of angiotensin II antagonist compared to dihydropyridine calcium channel blocker in childhood. *Kidney Int*. 2003;64(4):1450-1454.



Irina Benenson is an assistant professor at Rutgers University, New Brunswick, N.J.

Frederick A. Waldron is an attending ED physician at Beth Israel Medical Center, Newark, N.J.

Sallie Porter is an associate professor at Rutgers University, Newark, N.J.


The authors and planners have disclosed no potential conflicts of interest, financial or otherwise.

DOI-10.1097/01.NPR.0000660332.31690.68

CE 1.5 CONTACT HOURS  Rx 0.5 CONTACT HOUR

# Pediatric hypertension: A guideline update

**General Purpose:** To provide information about the recent clinical guideline updates for screening, diagnosis, and treatment of hypertension in children and adolescents. **Learning Objectives/Outcomes:** After completing this learning activity, you should be able to: **1.** Identify the risk factors, prevalence, and etiology for primary and secondary pediatric hypertension. **2.** Describe the updated clinical practice guidelines for screening and diagnosis of hypertension in children and adolescents. **3.** Summarize the new pediatric clinical practice guidelines for managing hypertension nonpharmacologically with lifestyle modifications and pharmacologically with use of antihypertensive medications.

**1. Children at higher risk for hypertension include those who have a**
a. history of prematurity and low birth weight.
b. a history of underweight and low insulin levels.
c. non-Hispanic White racial background.

**2. The occurrence of secondary hypertension is most often due to the etiology of**
a. cardiac disorders.
b. endocrine disorders.
c. kidney disorders.

**3. Pediatric hypertension that occurs secondary to renovascular disease with renal artery stenosis has a clinical clue of**
a. an abdominal bruit.
b. periodic headaches.
c. delayed femoral pulses.

**4. According to the modifications endorsed by the American Heart Association, a BP reading of 134/82 mm Hg for a 15-year-old male would meet the definition of**
a. elevated BP. b. stage 1 hypertension.
c. stage 2 hypertension.

**5. According to the hypertension guideline updates for children ages 1 to 13 years, a child diagnosed with stage 2 hypertension has**
a. both systolic BP and diastolic BP <90th percentile.
b. systolic and/or diastolic BP ≥90th percentile but <95th percentile.
c. systolic and/or diastolic BP ≥95th percentile plus 12 mm Hg.

**6. According to the March 2020 update of the Bright Futures/American Academy of Pediatric Recommendations for Preventive Pediatric Health Care, an obese child over age 3 should be screened for hypertension**
a. annually. b. every 3 months.
c. at every healthcare encounter.

**7. To achieve optimal BP measurement for a child, the recommended position is**
a. lying flat with right arm lower than heart level.
b. standing with right arm elevated above heart level.
c. seated with feet flat on floor and right arm supported at heart level.

**8. A 13-year-old male patient's BP is measured in the office today for his annual visit and the result is 142/100. Utilizing the updated clinical practice guidelines,**
a. record this first measurement of 142/100.
b. attain another BP measurement and record the second reading instead of the first.
c. take two additional BP measurements and record an average of the last two readings.

**9. The initial evaluation of the child with hypertension should focus on determining the etiology of the BP elevation such as asking about symptoms of acute glomerulonephritis that include**
a. presence of hematuria.
b. increased urine output.
c. pale-yellow urine color.

**10. If pharmacologic therapy is being considered for a child with hypertension, clinical guidelines recommend obtaining a/an**
a. lipid panel. b. echocardiogram.
c. renal ultrasound.

**11. Utilizing information from the updated clinical practice guidelines, the goal of hypertension therapy was achieved by**
a. AJ who is a 9-year-old with a BP in the 95th percentile.
b. CP who is an 11-year-old with a BP in the 85th percentile.
c. KL who is a 15-year-old with a BP reading of 136/84 mm Hg.

**12. DASH diet modifications include a/an**
a. increase in sugar and salt consumption.
b. reduction of low-fat dairy products and whole grains.
c. greater intake of fresh fruits, vegetables, and lean red meats.

**13. When using nonpharmacologic strategies to manage pediatric hypertension, clinical practice guidelines recommend scheduling follow-up visits every**
a. 4 to 6 weeks. b. 3 to 6 months.
c. 7 to 9 months.

**14. Which child is likely to benefit from antihypertensive medications?**
a. DL who is a 9-year-old with stage 1 hypertension
b. LR who is an 11-year-old with LVH
c. TG who is a 14-year-old with normal BP readings using DASH diet

**15. Which is a common adverse reaction that can occur in children with hypertension taking an ACE inhibitor?**
a. fatigue b. dizziness
c. glucose intolerance

**16. Which antihypertensive medication would be the recommended choice for a pediatric patient diagnosed with renal artery disease?**
a. amlodipine b. enalapril
c. valsartan

**17. Beta-blockers are not recommended to use for initial therapy in pediatric patients because they**
a. are less effective than other antihypertensive drugs.
b. cause elevation in creatinine levels and hyperkalemia.
c. are contraindicated if sinus node dysfunction is present.

**18. After initiating antihypertensive medication for a 10-year-old male patient, until goal BP is reached, dose adjustment reassessments should initially be scheduled every**
a. 4 to 6 weeks. b. 3 to 4 months.
c. 6 to 9 months.

**19. Which of the following is cited as the most frequent reason for poorly controlled hypertension?**
a. nonadherence to medication therapy
b. not following the diet therapy recommended
c. lack of following suggested lifestyle modifications

**20. A crucial strategy to achieve BP control for pediatric patients includes**
a. no changes to the family's eating habits.
b. shared decision-making that involves children and their parents.
c. asking the patient to change his or her lifestyle without parent input.

**Notice:** *The Nurse Practitioner* will no longer facilitate mail-in continuing education tests, and all CE tests must be taken online at https://nursing.ceconnection.com. Please address any questions to customer service at 1-800-787-8985.