



**CARDI•OH**

Ohio Cardiovascular Health Collaborative



*In partnership with:*



# Cardi-OH ECHO Reducing the Burden of Hypertension

Thursday, March 12, 2020

# Disclosure Statements



The following planners, speakers, moderators, and/or panelists of the CME activity have financial relationships with commercial interests to disclose:

- Adam T. Perzynski, PhD reports being co-founder of Global Health Metrics LLC, a Cleveland-based software company and royalty agreements for forthcoming books with Springer publishing and Taylor Francis publishing.
- Brian Bachelder, MD received funds for his role as Physician Advisor at VaxCare.
- SiranM. Koroukian, PhD received grant funds for her role as a subcontractor on a study funded by Celgene.
- Christopher A. Taylor, PhD, RDN, LD, FAND reports grant funding and travel support for his role as a consultant, researcher, and presenter for Abbott Nutrition, and is also a member of the Scientific Advisory Council of Viocare, Inc.
- Jackson T. Wright, Jr., MD, PhD reports research support from the NIH and Ohio Department of Medicaid and consulting with NIH, AHA, and ACC.
- These financial relationships are outside the presented work.

All other planners, speakers, moderators, and/or panelists of the CME activity have no financial relationships with commercial interests to disclose.

# Special Populations: Children and Adolescents



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# Objectives



- Describe the epidemiology and impact of pediatric hypertension.
- Describe diagnostic criteria for diagnosis of hypertension in children.
- Describe the challenge of measurement in children and emerging strategies to overcome it.

# Diagnosis, Epidemiology, and Management of Hypertension in Children

Goutham Rao, MD



National guidelines for the diagnosis and management of hypertension in children have been available for nearly 40 years. Unfortunately, knowledge and recognition of the problem by clinicians remain poor. Prevalence estimates are highly variable because of differing standards, populations, and blood pressure (BP) measurement techniques. Estimates in the United States range from 0.3% to 4.5%. Risk factors for primary hypertension include overweight and obesity, male sex, older age, high sodium intake, and African American or Latino ancestry. Data relating hypertension in childhood to later cardiovascular events is currently lacking. It is known that BP in childhood is highly predictive of BP in adulthood. Compelling data about target organ damage is available, including the association of hypertension with left ventricular hypertrophy, carotid-intima media thickness, and microalbuminuria. Guidelines from both the United States and Europe include detailed recommendations for diagnosis and management. Diagnostic standards are based on clinic readings, ambulatory BP monitoring is useful in confirming diagnosis of hypertension and identifying white-coat hypertension, masked hypertension, and secondary hypertension, as well as monitoring response to therapy. Research priorities include the need for reliable prevalence estimates based on diverse populations and data about the long-term impact of childhood hypertension on cardiovascular morbidity and mortality. Priorities to improve clinical practice include more education among clinicians about diagnosis and management, clinical decision support to aid in diagnosis, and routine use of ambulatory BP monitoring to aid in diagnosis and to monitor response to treatment.

## abstract

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# IMAGINE

# First NHLBI Report on Pediatric Hypertension 1977



- “Detection and management of hypertension in children and the precursors of hypertension in adults are the next major frontier”
- Recommended annual BP measurement in children  $\geq 3$  years
- Forty years later – most cases missed;

# Rationale



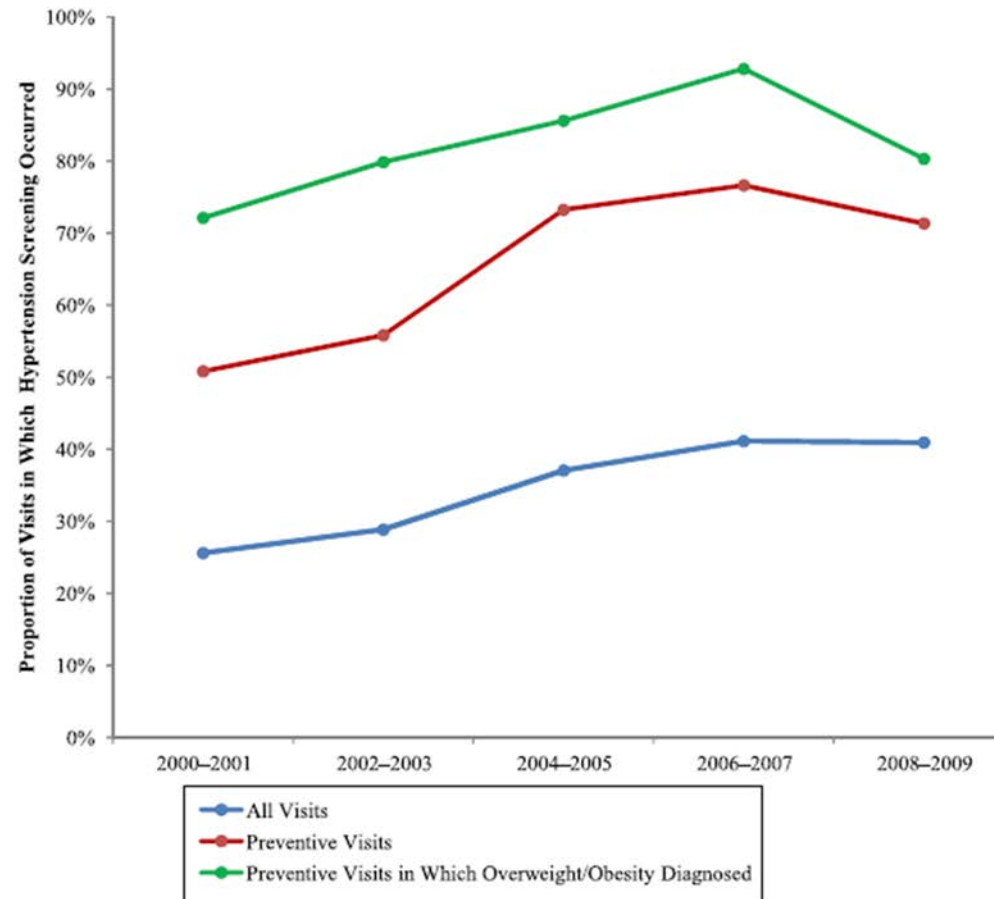
- Atherosclerosis begins in childhood
- Target organ damage takes place in childhood
- Secondary causes are more common in children
- Treatment (including medications) is safe and effective



# Why is hypertension missed?

- Failure to screen
- Improper technique
- Complexity of interpretation of blood pressure in children
- Lack of knowledge of follow-up and treatment guidelines

# Performance



**FIGURE 1**  
Frequency of hypertension screening in all pediatric visits, pediatric preventive visits, and pediatric preventive visits in which overweight/obesity was diagnosed, 2000-2009.

Shapiro et al, 2012

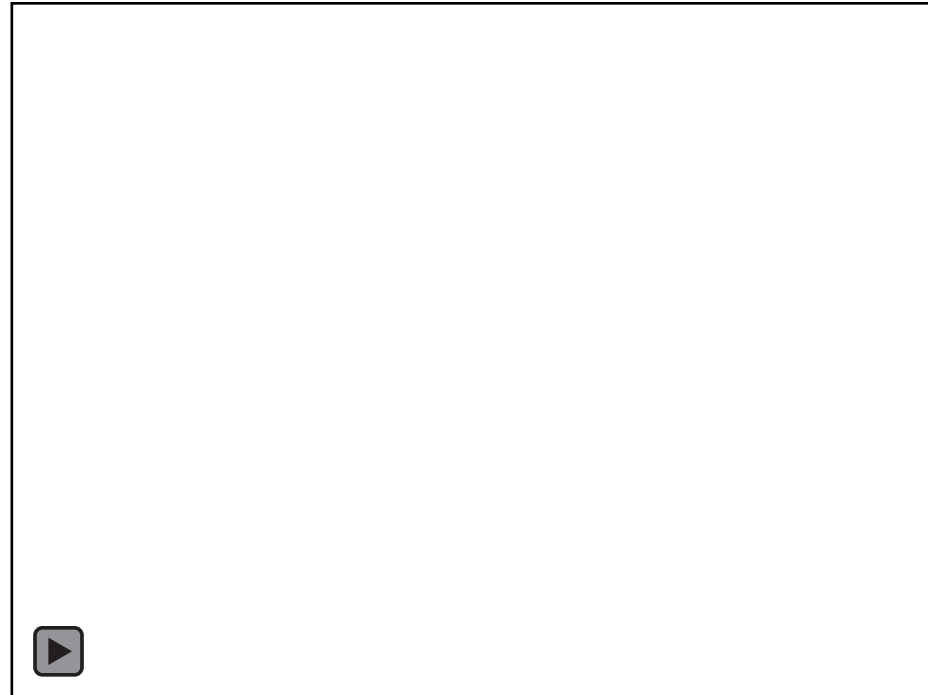
# Diagnostic Standards 2017

| For Children Aged 1–13 y   | For Children Aged $\geq 13$ y         |
|--|---------------------------------------|
| Normal BP: <90th percentile  | Normal BP: <120/<80 mm Hg             |
| Elevated BP: $\geq 90$ th percentile to <95th percentile or 120/80 mm Hg to <95th percentile (whichever is lower)  | Elevated BP: 120/<80 to 129/<80 mm Hg |
| Stage 1 HTN: $\geq 95$ th percentile to <95th percentile + 12 mmHg, or 130/80 to 139/89 mm Hg (whichever is lower) | Stage 1 HTN: 130/80 to 139/89 mm Hg   |
| Stage 2 HTN: $\geq 95$ th percentile + 12 mm Hg, or $\geq 140/90$ mm Hg (whichever is lower)                       | Stage 2 HTN: $\geq 140/90$ mm Hg      |

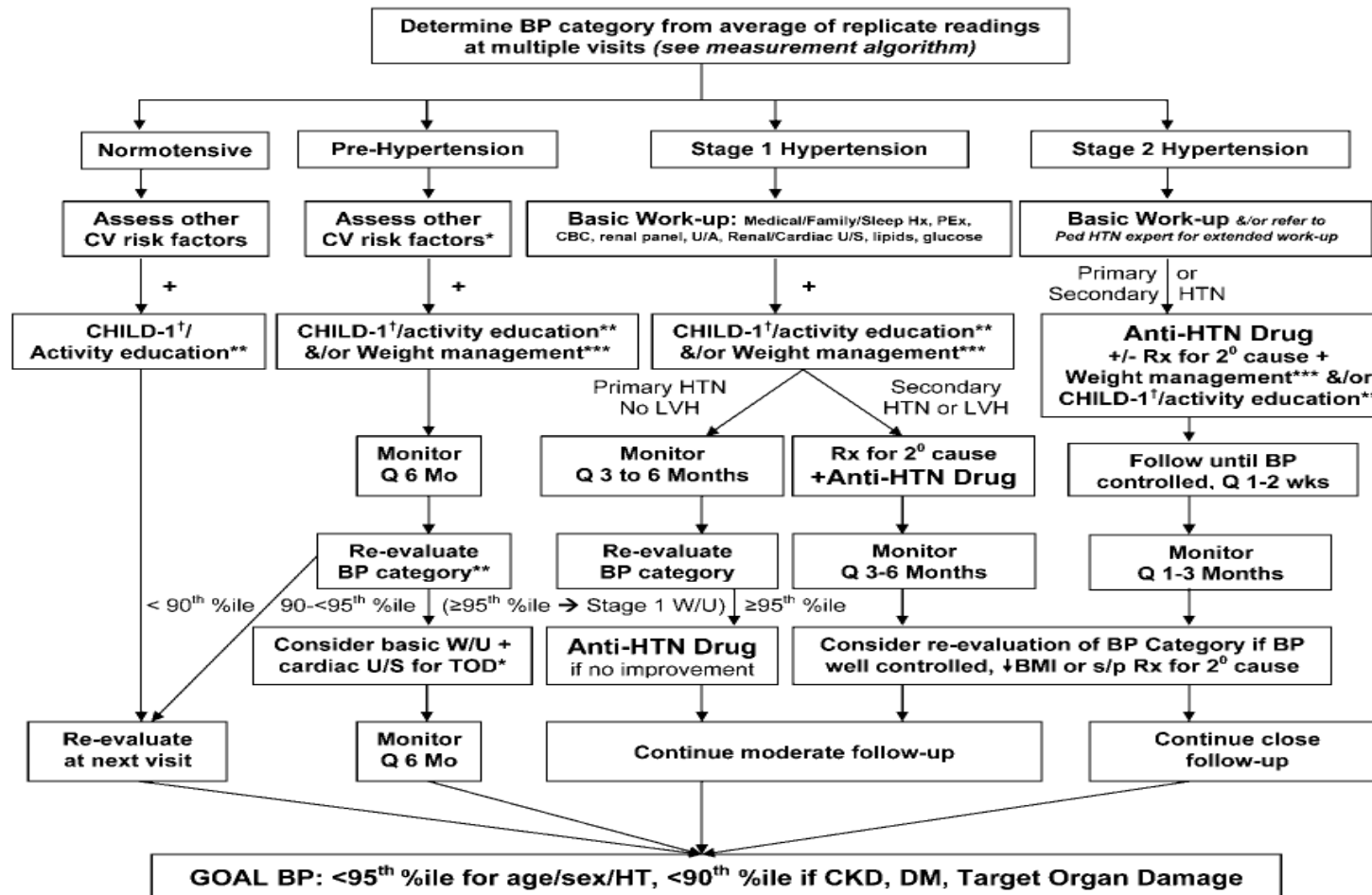
# The Patient should be:

- Relaxed
- Calm
- Seated

# Video Clip



# NHLBI Guidelines on Evaluation



**LEGEND:**

- \* Work up for target organ damage (TOD)/ LVH if obese or (+) for other CV risk factors;
- † Cardiovascular Health Integrated Lifestyle Diet; See Section V. Nutrition and Diet;
- \*\* Activity Education. See Section VI. Physical Activity;
- \*\*\* Weight management. See Section X. Overweight and Obesity.

# Odds Ratios of Factors Associated with Secondary Hypertension

**TABLE V. HTN Factors Associated With Increased Risk of Secondary**

| Variable                        | Logistic Regression |                | Likelihood Function Analysis |
|---------------------------------|---------------------|----------------|------------------------------|
|                                 | OR (95% CI)         | <i>P</i> Value | LR                           |
| Abnormal RUS findings           | 4.89 (1.99–12.01)   | .001           | 742.9                        |
| DBP <i>z</i> score <sup>a</sup> | 3.33 (1.49–7.46)    | .003           | –                            |
| Young age (5–11.9 y)            | 2.22 (1.09–4.53)    | .03            | 22.9                         |

Abbreviations: DBP, diastolic blood pressure; OR, odds ratio (OR >1 and *P* < .05 statistically significant); LR, likelihood ratio (between 1 and 8 = weak evidence, between 8 and 32 = moderate evidence, and >32 = strong evidence); RUS, renal ultrasound. <sup>a</sup>For the 12- to 19-year-old age group.

# Lifestyle Recommendations AAP 2017 Guidelines



20. At the time of diagnosis of elevated BP or HTN in a child or adolescent, clinicians should provide advice on the DASH diet and recommend moderate to vigorous physical activity at least 3 to 5 d per week (30–60 min per session) to help reduce BP.

**TABLE 16** DASH Diet Recommendations

| Food   | Servings per Day |
|--|------------------|
| Fruits and vegetables                                  | 4–5              |
| Low-fat milk products                                  | ≥2               |
| Whole grains   | 6                |
| Fish, poultry, and lean red meats                      | ≤2               |
| Legumes and nuts                                       | 1                |
| Oils and fats  | 2–3              |
| Added sugar and sweets (including sweetened beverages) | ≤1               |
| Dietary sodium   | <2300 mg per d   |



# A Common Scenario



- Alex is a 12-year-old boy with obesity with 3 BP readings averaging 97<sup>th</sup> percentile; ABPM mean, 98<sup>th</sup> percentile; Systolic load 40%. Basic workup is shows elevated triglycerides. Other tests negative.

# Alex Cont'd



- Lifestyle counseling initiated. Periodic monitoring and encouragement.
- BP goal < 95<sup>th</sup> percentile
- BP remains at 97<sup>th</sup> percentile, ABPM, mean 97<sup>th</sup> percentile; Systolic load, 30%. No change in BMI percentile.
- What next?

# Alex Cont'd

- Continue lifestyle changes
- Start enalapril
- 5mg/day – titrate up to 20mg/day
- BP < 95<sup>th</sup> percentile; Normal ABPM; No change in BMI percentile

Thank you!

Questions/Discussion