**Highlights – AAP Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents**

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<http://pediatrics.aappublications.org/content/pediatrics/140/3/e20171904.full.pdf>

**Screening**

BP should be measured in children/adolescents > 3 years old:

* Annually if otherwise healthy
* At every health care encounter if they have obesity, are taking medications known to elevate BP, have renal disease, h/o aortic arch obstruction or coarctation, or diabetes.

The initial BP may be oscillometric or auscultatory.

**Quick screener: BP requiring further evaluation**

**(Based on 90% for children @ 5% height)**

| **Age, y** | **BP, mm Hg** |
| --- | --- |
| **Boys** | **Girls** |
| **Systolic** | **DBP** | **Systolic** | **DBP** |
| 1 | 98 | 52 | 98 | 54 |
| 2 | 100 | 55 | 101 | 58 |
| 3 | 101 | 58 | 102 | 60 |
| 4 | 102 | 60 | 103 | 62 |
| 5 | 103 | 63 | 104 | 64 |
| 6 | 105 | 66 | 105 | 67 |
| 7 | 106 | 68 | 106 | 68 |
| 8 | 107 | 69 | 107 | 69 |
| 9 | 107 | 70 | 108 | 71 |
| 10 | 108 | 72 | 109 | 72 |
| 11 | 110 | 74 | 111 | 74 |
| 12 | 113 | 75 | 114 | 75 |
| ≥13 | 120 | 80 | 120 | 80 |

**Algorithm for screening**



The updated Clinical Practice

**Updated Definitions of BP Categories and Stages**

| **For Children Aged 1–<13 y** | **For Children Aged ≥13 y** |
| --- | --- |
| Normal BP: <90th percentile | Normal BP: <120/**<**80 mm Hg |
| Elevated BP: ≥90th 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: ≥95th 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: ≥95th percentile + 12 mm Hg, or ≥140/90 mm Hg (whichever is lower) | Stage 2 HTN: ≥140/90 mm Hg |

**Patient Evaluation and Management According to BP Level**

| **BP Category (See Table 3)** | **BP Screening Schedule** | **Lifestyle Counseling (Weight and Nutrition)** | **Check Upper and Lower Extremity BP** | **ABPM**[**a**](https://pediatrics.aappublications.org/content/140/3/e20171904#fn-19) | **Diagnostic Evaluation**[**b**](https://pediatrics.aappublications.org/content/140/3/e20171904#fn-20) | **Initiate Treatment**[**c**](https://pediatrics.aappublications.org/content/140/3/e20171904#fn-21) | **Consider Subspecialty Referral** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Normal | Annual | X | — | — | — | — | — |
| Elevated BP | Initial measurement | X | — | — | — | — | — |
| Second measurement: repeat in 6 mo | X | X | — | — | — | — |
| Third measurement: repeat in 6 mo | X | — | X | X | — | X |
| Stage 1 HTN | Initial measurement | X | — | — | — | — | — |
| Second measurement: repeat in 1–2 wk | X | X | — | — | — | — |
| Third measurement: repeat in 3 mo | X | — | X | X | X | X |
| Stage 2 HTN[d](https://pediatrics.aappublications.org/content/140/3/e20171904#fn-22) | Initial measurement | X | X | — | — | — | — |
| Second measurement: repeat, refer to specialty care within 1 wk | X | — | X | X | X | X |

* X, recommended intervention; —, not applicable.
* [↵](https://pediatrics.aappublications.org/content/140/3/e20171904#xref-fn-19-1)a ABPM is done to confirm HTN before initiating a diagnostic evaluation.
* [↵](https://pediatrics.aappublications.org/content/140/3/e20171904#xref-fn-20-1)b See Table 15 for recommended studies.
* [↵](https://pediatrics.aappublications.org/content/140/3/e20171904#xref-fn-21-1)c Treatment may be initiated by a primary care provider or subspecialist.
* [↵](https://pediatrics.aappublications.org/content/140/3/e20171904#xref-fn-22-1)d If the patient is symptomatic or BP is >30 mm Hg above the 95th percentile (or >180/120 mm Hg in an adolescent), send to an ED.

**More detailed review of 2017 Guideline:**

30 Key Action Statements.

Some are noted in this summary, for the rest see the original article.

Pediatric hypertension

* 2%–5% of all pediatric patients
* one of the top five chronic diseases in children and adolescents.
* diagnosis is missed in up to 75% of pediatric patients in primary care settings

**Highlights of the new pediatric hypertension guideline include:**

* development based on a strict evidence-based approach as recommended by the National Academy of Medicine and the NHLBI National Heart, Lung, and Blood Institute;
* replacement of the term “prehypertension” with “elevated blood pressure”;
* new normative blood pressure tables based on **children with normal weight;**
* simplified screening table for identifying blood pressures needing further evaluation;
* simplified blood pressure classification in adolescents 13 years of age and older that aligns with forthcoming American Heart Association/American College of Cardiology adult blood pressure guidelines;
* a more limited recommendation to perform screening blood pressure measurement only at preventive care visits;
* streamlined recommendations on initial evaluation and management of abnormal blood pressures;
* expanded role for ambulatory blood pressure monitoring in both diagnosis and ongoing management of pediatric hypertension;
* more limited recommendation on when to perform an echocardiogram in the evaluation of newly diagnosed hypertensive pediatric patients (generally only before medication initiation);
* revised definition of left ventricular hypertrophy;
* revised treatment goals based on published evidence; and
* 30 evidence-based key action statements and an additional 27 clinical recommendations based on expert opinion.

**How to take a BP properly**

-Patient should be seated comfortably with feet flat on the floor, with back supported, legs uncrossed for 5 minutes. The upper arm bare should be bare to the shoulder

-Patient’s arm should be supported at heart level.

-Length: Cuff *bladder* should encircle 80%-100% of the patient’s arm circumference.

Width: Cuff *bladder* should cover ~50% of the upper arm (between the acromion and the olecranon)

-The midline of the bladder should be over the brachial artery and 2-3cm above the elbow crease.

-Inflate the cuff while palpating the radial artery. Note the mm/Hg when you can no longer feel the pulse. Wait 15-30 secs , Add 20 mm/Hg to prior reading and inflate.

-Use the bell of the stethoscope. The cuff should not touch the bell (do not tuck it under the cuff).

-Neither the patient nor the person taking the measurement should talk during the procedure.



**Evaluation**

-if the initial BP is elevated (>/= 90%) repeat 2 auscultatory BP at the same visit and average them\*

**-BP normal or normalizes after repeat (<90%)**

--recheck at next WCC

-**Elevated BP (>/= 90% to < 95% or 120/80 whichever is lower)**

--Recommend lifestyle interventions and consider nutrition or weight

 management referral if appropriate

--Repeat in 6 months

-Second visit (in 6 months\_

-BP still elevated

--upper and lower BP check (right and left arm and 1 leg)

--repeat lifestyle counseling

--recheck BP in 6 months

-Third visit

-BP still elevated 12 months after initial visit

--Order ABPM if available (ambulatory BP monitoring)

--Consider subspecialty referral

--All patients: (table 10, page 19)

UA

Chem panel (including BUN, Cr)

Lipid profile (fasting or non-fasting)

Renal U/S in < 6yo or abnormal U/A or renal fx

--Obese patients (BMI >/=95%)

add the following:

HA1c

AST/ALT

Lipid panel, fasting

--Consider the following in certain circumstances

fasting serum glucose (if high risk of DM)

TSH

Drug screen

Sleep study

CBC (especially in growth delay or abnormal renal fx

-If BP normalizes at any point return to routine annual BP checks at WCC

**-Stage 1 htn (>/=95% to <95% +12 mmHg or 130/80 to 139/89, whichever is lower)**

--Asymptomatic

lifestyle counseling

recheck BP in 1-2 weeks by auscultation

Second visit (1-2 weeks)

If still elevated to stage 1:

Upper and lower exp BPs (right and left arm and one leg)

Nutrition or weight management referral if appropriate

Recheck BP in 3 months by auscultation

Third visit

Still stage 1 htn

Consider subspecialty referral

Order ABPM (if available)

Diagnostic evaluation (table 15 pages 27-28)

Initiate Treatment (Primary care provider or Specialist)

**-Stage 2 htn (>/= 95% + 12mmHg or >/= 140/90, whichever is lower)**

Asymptomatic

Upper and lower BP check (right and left arm and 1 leg)

Lifestyle recommendations given

Repeat BP in 1 week or alternatively

Refer to subspecialty care w/i 1 week

Second Visit (1 week)

Diagnostic evaluation (table 15 pages 27-28)

ABPM

Treatment initiated

Or patient should be seen by subspecialist w/i 1 week

Symptomatic or BP > 30 mmHg > 95%, or >180/120

Immediate ED care

**Diagnosis of HTN:** should be made by trained health care professionals in the office setting if the patient has auscultatory confirmed BP reading >/= 95% at 3 different visits (KAS 3)

**Treatment**

Overall Goals

* Achieving a BP that reduces risk for target organ damage in childhood
* Reduce risk of htn and related CVD in adulthood

At the time of Dx of elevated BP or HTN, Offer patients the following (KAS 20)

* Advice on the DASH diet
* Moderate to vigorous aerobic physical activity at least 3-5 X/ wk (30-60 mins/session)

Treatment goal nonpharmacologic and pharmacologic (KAS 19)

* Children <90% SBP and DBP
* Adolescents >/= 13 yo < 130/80

**Pharmacologic Treatment**

In hypertensive children/adolescents who have failed lifestyle modifications (particularly those with LV hypertrophy on echo, symptomatic htn, stage 2 htn without a clearly modifiable factor (ie obesity), clinicians should initiate pharmacologic treatment

In Children/Adolescents:

* Antihypertensive meds decrease BP with few adverse effects
* Few studies compare different agents, and those studies that have been done show little difference
* No clinical trials in children that have CV end points as outcome
* Long-term studies on the safety of antihypertensive meds in children and their
* impact on future CVD are limited
* Physician should initiate treatment with one of the following
	+ ACE inhibitors
	+ ARB **(**Angiotensin II receptor blockers)
	+ Long-acting Ca channel blockers
	+ Thiazides

**Considerations**

* African American children may need a higher starting dose of ACE inhibitor. Alternatively may start with thiazide or long-acting Ca-blocker
* B-blockers are no longer recommended as initial treatment in children (due to data in adults: expanded adverse effect profile and lack of improved outcomes compared to other agents)
* Contraindicated in pregnancy: ACE inhibitors and ARBs

**Extra tidbits:**

**ABPM: (**KAS 6-7)

* should be performed for confirmation of HTN with office BP measurements in the elevated BP category for 1 year or more or with state 1 HTN over 3 clinic visits.
* Routine ABPM should be strongly considered in those withhigh-risk conditions (table 12, pg 21)

**White Coat Hypertension (**KAS 9)

* ABPM should be used in patients with suspected WCH
* Diagnosis: mean SBP and DBP < 95%, and SBP and DBP Load < 25% (load= % of valid ambulatory BP measurements > 95%)
* data in adults WCH compared to normotensive adults shows only slight increased risk of adverse outcomes, but at a much lower risk compared with those with established htn.

**Primary htn** is now the predominant dx for hypertensive children and adolescents seen in referral centers in the US.

**->/= 6yo**

-+ fm hx (parent or grandparent)

-overweight or obese

(KAS 11)

Children >/=6 yo do not need an extensive evaluation for secondary causes if they have +fm hx, are overweight or obese, and/or do not have a hx or PE findings suggestive of a secondary cause of htn

**ECG** (KAS 14)

Not indicated in children with htn as a way to assess LVH

**Echo:** (KAS 15)

Recommended to assess for cardiac target organ damage at the time of consideration of pharmacologic treatment of HTN.

**Uric Acid:** 2 studies (NHANES 1999-2000; and a small Italian study) found higher UA levels associated with higher BP in adolescents; Findings suggest that an elevated UA may best be viewed as 1 component of CV risk assessment especially in the obese.

There is currently insufficient evidence to support routine testing of UA for evaluation and management of elevated BP.