

Fast facts

Hypertensive thresholds vary by gender, age and height until 13 years of age.

Many electronic health records (EHR) can provide blood pressure percentile to help alert provider during the visit to elevated blood pressure. There are also several mobile apps which will provide percentiles based on age, gender and height. Please ensure app and/or EHR is using 2017 "Clinical Practice Guidelines for Screening and Management of High Blood Pressure in Children and Adolescents"

Several over the counter medications can cause hypertension including decongestants/cold medications (phenylephrine), herbal supplements (including ginkgo, ginseng, licorice, St. John Wort) and caffeine.

Left ventricular hypertrophy (LVH) is the most prominent clinical evidence of target-organ damage caused by hypertension and has been reported in up to 38% of children and adolescents with untreated hypertension. EKG should not be used to assess for LVH.

Background

Evidence shows that primary hypertension occurs commonly in children and is often associated with obesity. Secondary hypertension is more common in children than adults, so the possibility of an underlying disorder should be considered in every pediatric patient with hypertension.

Definition of Hypertension:

Auscultatory systolic BP and/or diastolic BP $>$ or $=$ 95th percentile for gender, age and height on **3 or more** separate visits.

Elevated BP:

Newborn to 13 year-old: SBP and/or DBP readings that are 90th but $<$ 95th percentile.
13 year-old: 120/ $<$ 80 to 129/ $<$ 80.

Stage 1 hypertension:

Newborn to 13 year-old: SBP and/or DBP readings that are 95th but $<$ 95th percentile plus 12 mmHg.
13 year-old: 130/80 to 139/89 mmHg.

Stage 2 hypertension:

Newborn to 13 year-old: SBP and/or DBP levels that are $>$ 95th percentile plus 12 mmHg.
13 year-old: $>$ 140/90 mmHg.

Ages 1y-12y [See Clinical Practice Guidelines Tables 4 and 5 for BP percentiles by gender, age and height.](#) , Table 1 provides initial screening tool

Ages 0-12months: see figure 1 below for percentiles by age and gender

Assessment

- All children $>$ 3 years old should have BP measured at least once a year
- Children of any age with risk for hypertension (either obesity or condition listed below) should have BP measured at every health care encounter
 - History of prematurity, very low birth weight, or other complications requiring ICU care
 - Congenital heart disease
 - Recurrent UTI, hematuria or proteinuria
 - Known kidney disease or urologic malformations (eg. Solitary kidney, vesicoureteral reflux, UPJ obstruction)
 - Family history of congenital kidney disease
 - History of solid-organ transplant
 - History of malignancy or bone marrow transplant
 - Treatment with drugs known to raise BP
 - Other systemic illnesses associated with hypertension (neurofibromatosis, tuberous sclerosis)
 - Evidence of elevated intracranial pressure
 - History of AKI or glomerulonephritis

Blood pressure Measurement Technique

- Seated quietly for 3-5 minutes, back supported and feet uncrossed on the floor
- Right arm should be uncovered (bare) under cuff and arm out of sleeve (not rolled up), at heart level, elbow at a 90 degree angle and lower arm supported
- Patient and observer should not speak during measurement as both talking and active listening can increase blood pressure

Use Table 1 as a screening tool. If concern for hypertension or blood pressure above 90th percentile (below), blood pressure should be obtained via **manual auscultation** (see graphic) and proper cuff by cuff markers and compared against [95th percentile tables in Clinical Practice Guidelines Tables 4 and 5 for BP percentiles by gender, age and height.](#)

Table 1: Lowest thresholds by age

90th percentile BP a 5th percentile height
BPs above this should be checked manually and then compared against the [95th percentile tables for gender, height and age.](#)

Age	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

Red flags

- Symptomatic hypertension: headache, change in vision, chest pain, nose bleeds particularly if associated with stage 2 hypertension
- Periorbital or extremity edema
- Gross hematuria
- Urinalysis with large protein

Management/treatment

Patients who have elevated blood pressure or stage 1 hypertension, without risk factors, should be counselled on healthy lifestyle: low salt diet, vigorous exercise 3-5 days a week for 30-60 minutes, limit/eliminate sugar, fast food, 'junk' food.

Frequent follow-up (every 2-4 weeks) recommended to provide feedback and encouragement.

When to refer:

1. Manual BPs above 95th percentile over 3 separate ambulatory appointments- please refer to CHoR pediatric nephrology.
2. Presence of red flags or concern for secondary hypertension (high risk as listed in assessment)
3. Stage 2 hypertension (do not need 3 separate visits to confirm particularly if symptomatic or high risk)

Please call our on-call nephrology physician if concern for red flags or stage 2 hypertension requiring ER visit or urgent appointment. Our nephrology team prides itself in seeing urgent patients within 24-48 hours, and can get patients into clinic or through ER quickly.

Testing at the time of referral: urinalysis (preferably first morning) with microscopy

Optional testing at time of referral: Basic metabolic panel, Fasting glucose and lipids, TSH and free T4, Renal and bladder ultrasound (please provide images if not done at CHOR site), sleep study if obese/ symptoms of OSA
Please send all results to Fax: 804-628-5853

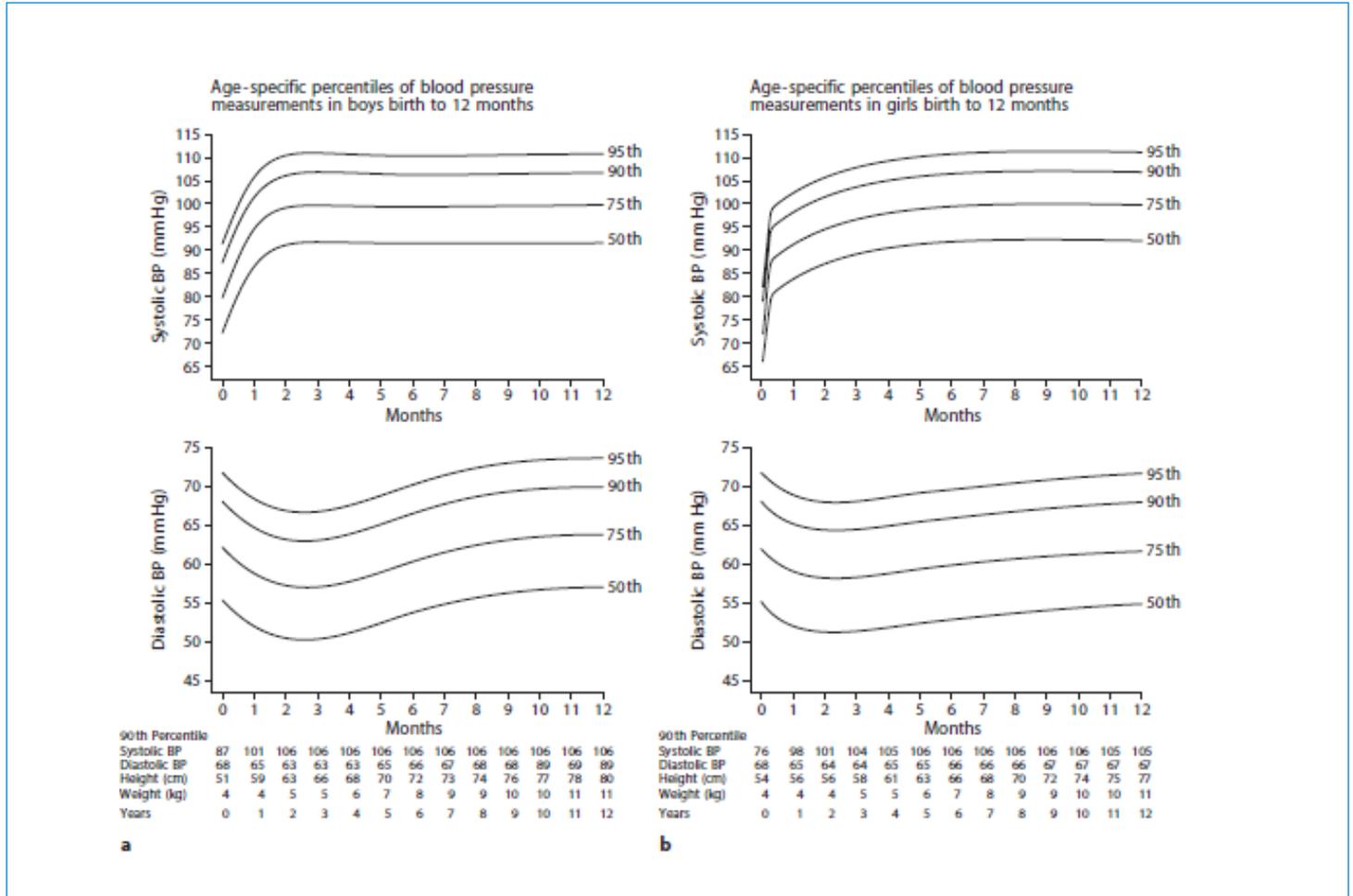
References

Clinical Practice Guidelines for Screening and Management of High Blood Pressure in Children and Adolescents. J. Flynn et al. Pediatrics September 2017, 140(3) e20171904

Supplemental information

Figure 1

Blood pressure percentiles for infants 0-12 mo of age Report of the Second Task Force on Blood Pressure Control in Children



- Factors for Increased Risk of Hypertension
- History of prematurity, very low birth weight, or other complications requiring ICU care
 - Congenital heart disease
 - Recurrent UTI, hematuria or proteinuria
 - Known kidney disease or urologic malformations (eg. Solitary kidney, vesicoureteral reflux, UPJ obstruction)
 - Family history of congenital kidney disease
 - History of solid-organ transplant
 - History of malignancy or bone marrow transplant
 - Treatment with drugs known to raise BP
 - Other systemic illnesses associated with hypertension (neurofibromatosis, tuberous sclerosis)
 - Evidence of elevated intracranial pressure

Assessment:
 Check BP in all children greater than 3 at least once a year
 Children with risk for hypertension (obesity or condition listed) should have BP measured at all encounters.
 Are values higher than systolic or diastolic BP in screening table/ 90th percentile?

Screening Table
 90th percentile BP values for 5th percentile height

Age	Boys		Girls	
	Systolic	Diastolic	Systolic	Diastolic
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

No
 Assess at future visits as appropriate

Yes
 Take BP Manually
 Compare against Table 4 and 5 for age, sex, height

Counsel on healthy lifestyle: low salt diet, vigorous exercise 3-5 days a week for 30-60 minutes, limit/eliminate sugar, fast food, 'junk' food. Frequent follow-up (every 2-4 weeks) recommended to provide feedback and encouragement.

SBP and/or DBP between 90-95th percentile

SBP and/or DBP Higher than 95th percentile

Are Red Flags Present?
 Symptomatic hypertension: headache, change in vision, chest pain, nose bleeds particularly if associated with stage 2 hypertension
 Periorbital or extremity edema
 Gross hematuria
 Urinalysis with large protein

Consider ED or Urgent (24-48 hour) referral to CHoR Nephrology

No red flags, SBP and/or DBP Higher than 95th percentile but lower than 95th percentile plus 12mm Hg

No red flags, SBP and/or DBP Higher than 95th percentile plus 12 mm Hg

Counsel on healthy lifestyle: low salt diet, vigorous exercise 3-5 days a week for 30-60 minutes, limit/eliminate sugar, fast food, 'junk' food. Recheck BP manually over 3 separate Ambulatory Visits

SBP and/or DBP Higher than 95th percentile over 3 visits

For a provider to provider consult with a CHoR Nephrology provider or to schedule an urgent visit call CHoR's 1PAL line 804-628-1PAL (1725)

Referral to CHoR Nephrology
 Testing at the time of referral: urinalysis (preferably first morning) with microscopy
 Optional testing at time of referral: Basic metabolic panel, Fasting glucose and lipids, TSH and free T4, Renal and bladder ultrasound (please provide images if not done at CHOR site), sleep study if obese/ symptoms of OSA

Reference for BP Tables: Clinical Practice Guidelines for Screening and Management of High Blood Pressure in Children and Adolescents. J. Flynn et al. Pediatrics September 2017, 140(3) e20171904