

Hypertension in Children

New definition

Hypertension staging

Blood pressure Charts

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Introduction

Primary (essential) hypertension occurs frequently in adults

It is a major risk factor for myocardial infarction, CVA(stroke)and CKD

In adults with hypertension, a 5 mm Hg ↑in diastolic blood pressure (BP) increases:

- The risk of coronary artery disease by 20%

- The risk of stroke by 35%.

Hypertension is a major cause of ESKD in adults only second to the diabetes

The prevalence of adult hypertension increases with age, ranging from 15% in young adults to 60% in individuals older than 65 yr

introduction

Of the 32.6% of US adults who have HTN, almost half (17.2%) are not aware that they have HTN; even among those who are aware of their condition, only approximately half (54.1%) have controlled BP

INTRODUCTION

Adult hypertension (HTN) has its antecedents during childhood

Childhood blood pressure (BP) can predict adult BP

Almost half of hypertensive adults had a BP >90th percentile as children

Children with HTN may remain hypertensive particularly in the presence of:

- Family history of HTN

- Increased body weight

- Increased left ventricular mass

HTN in childhood and adolescence may contribute to:

- Premature atherosclerosis

- Early onset CVS disease

Identification of HTN and successful treatment may have an important impact on long-term outcomes of CVD

PREVALENCE OF HTN IN CHILDREN

prevalence of HTN in infants and young children is <1% and is often secondary

Also Severe and symptomatic HTN in children is usually secondary

Primary hypertension is prevalent mostly in older school-age children and adolescents in parallel with obesity

In US National Health and Nutrition Examination Survey

(NHANES) 9% of American youth have prehypertension and 3-4% have HTN

The influence of obesity on elevated BP is evident in children as young as 2-5yr old

Approximately 20% of American youth are obese, and up to 10% of them have HTN

Primary Hypertension in children

Children and adolescents ≥ 6 years of age do not require an extensive evaluation for secondary causes of HTN if they have:

- Positive family history of HTN

- Overweight or obese

- Lack of positive findings in Hx and PE in favor of 2nd HTN

Blood pressure goals for hypertension control, JNC 1–JNC 7

Report number (year of publication)	Committee chair	BP Goal (mm Hg)	Examples of seminal studies/influential reports
1 (1977)	Marvin Moser	DBP <90	8
2 (1980)	Iqbal Krishan	a. DBP <90 b. DBP 90–100 for individuals with moderate or severe hypertension	9
3 (1984)	Harriet Dustan	DBP <90	10–14
4 (1988)	Aram Chobanian	BP <140/90	15–17
5 (1993)	Ray Gifford	BP <140/90	18,19
6 (1997)	Sheldon Sheps	BP <140/90 and “lower if tolerated”	20–24
7 (2003)	Aram Chobanian	a. BP <140/90 b. <130/80 in patients with diabetes or renal disease	25,26

Table 1. Comparison of BP Target Recommendations

	BP Targets	BP Categories ^a		
			SBP (mm Hg)	DBP (mm Hg)
JNC 7, 2003	< 140/90 mm Hg < 130/80 mm Hg for those with diabetes or chronic kidney disease	Normal	< 120	< 80
		Prehypertension	120–139	80–89
		Stage 1 hypertension	140–159	90–99
		Stage 2 hypertension	≥ 160	≥ 100
JNC 8, 2014	< 150/90 mm Hg for patients ≥ 60 < 140/90 mm Hg for patients < 60, diabetes, and chronic kidney disease	Was not a comprehensive set of recommendations, and did not discuss hypertension diagnostic thresholds		
ACP/AAFP, 2017	< 150/90 mm Hg for patients ≥ 60 < 140/90 mm Hg for patients at higher CV risk, or with a history of stroke or TIA	Was not a comprehensive set of recommendations and did not discuss hypertension diagnostic thresholds Did not address recommendations in patients < 60		
ACC/AHA, 2017	≤ 130/80 mm Hg	Normal	< 120	< 80
		Elevated	120–129	< 80
		Stage 1 hypertension ^b	130–139	80–89
		Stage 2 hypertension	≥ 140	≥ 90

^aPatients with SBP and DBP in two different categories should be classified in the higher category.

^bAntihypertensive medication should be initiated in stage 1 hypertension only in patients with clinical CV disease, a 10-year risk of ASCVD of 10% or higher, diabetes mellitus, or chronic kidney disease.

BP = blood pressure; TIA = transient ischemic attack.

Clinical Guidelines of Hypertension in Children

- 1977 1st clinical guideline
- 2004 4th report

National Heart, Lung, and Blood Institute (NHLBI) who sponsored previous pediatric BP guidelines announced that NHLBI would no longer sponsor development of new clinical guidelines 2004

- AAP 2014 agreed to sponsor **CPG*** of HTN in children

Normative reference data and BP tables should be based on normal weight (body mass index <85th%) children

New guideline was developed in 2017

*Clinical Practice Guideline

Classification of Hypertension in Children and Adolescents, With Measurement Frequency and Therapy Recommendations 2004

	SBP or DBP Percentile
Normal	<90th percentile
Prehypertension	90th percentile to <95th percentile, or if BP exceeds 120/80 even if below the 90th percentile up to <95th percentile
Stage 1 hypertension	95th percentile to the 99th percentile plus 5 mmHg
Stage 2 hypertension	>99th percentile plus 5 mmHg

CLINICAL PRACTICE GUIDELINE Guidance for the Clinician in Rendering Pediatric Care

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents

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New Normative Blood Pressure Tables

4th Report BP tables generated from BP values in ~70,000 healthy children

- Many children had overweight or obesity

- Inclusion of these children likely biased normative BP values upward

New normative BP tables commissioned for this clinical practice guideline, based only on BP readings from ~50,000 **normal-weight children**

Definition of Hypertension in Children

BP \geq 95th percentile for age, sex, and height on \geq 3 occasions

Definition of HTN For children between 1 and 13 years of age

Normal BP – Both systolic BP (SBP) and diastolic BP (DBP) <90th percentile.

Elevated BP (previously referred to as prehypertension) – SBP and/or DBP ≥90th percentile but <95th percentile, **or** 120/80 mmHg to <95th percentile (whichever is lower).
Elevated BP is predictive of hypertension

Stage 1 hypertension – SBP and/or DBP ≥95th percentile to <95th percentile + 12 mmHg, **or** 130/80 to 139/89 mmHg (whichever is lower).

Stage 2 hypertension – SBP and/or DBP ≥95th percentile + 12 mmHg, **or** ≥140/90 mmHg (whichever is lower).

Definition of HTN For children ≥ 13 years of age

Normal BP – BP $< 120/80$ mmHg

Elevated BP (previously referred to as prehypertension) – SBP between 120 and 129 with a DBP < 80 mmHg

Stage 1 hypertension – BP between 130/80 to 139/89 mmHg

Stage 2 hypertension – BP $\geq 140/90$ mmHg.

2017 American Academy of Pediatrics updated definitions for pediatric blood pressure categories

	For children aged 1 to <13 years	For children aged ≥13 years
Normal BP	Systolic and diastolic BP <90 th percentile	Systolic BP <120 and diastolic BP <80 mmHg
Elevated BP	Systolic and diastolic BP ≥90 th percentile to <95 th percentile, or 120/80 mmHg to <95 th percentile (whichever is lower)	Systolic BP 120 to 129 and diastolic BP <80 mmHg
Stage 1 HTN	Systolic and diastolic BP ≥95 th percentile to <95 th percentile+12 mmHg, or 130/80 to 139/89 mmHg (whichever is lower)	130/80 to 139/89 mmHg
Stage 2 HTN	Systolic and diastolic BP ≥95 th percentile+12 mmHg, or ≥140/90 mmHg (whichever is lower)	≥140/90 mmHg

BP: blood pressure; HTN: hypertension.

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Blood pressure levels for boys by age and height percentile

BP (percentile)	Systolic BP (mmHg)								Diastolic BP (mmHg)							
	Height percentile or measured height								Height percentile or measured height							
	5%	10%	25%	50%	75%	90%	95%		5%	10%	25%	50%	75%	90%	95%	
1 year																
Height (in)	30.4	30.8	31.6	32.4	33.3	34.1	34.6	30.4	30.8	31.6	32.4	33.3	34.1	34.6		
Height (cm)	77.2	78.3	80.2	82.4	84.8	87.8	87.8	77.2	78.3	80.2	82.4	84.8	86.7	87.8		
50 th	85	85	86	87	88	89	89	40	40	41	41	42	42	42		
90 th	88	89	90	90	90	101	101	52	52	53	53	54	54	54		
95 th	102	102	103	103	104	105	105	54	54	55	55	56	57	57		
95 th + 12 mmHg	114	114	115	115	116	117	117	66	66	67	67	68	69	69		
2 years																
Height (in)	33.9	34.4	35.3	36.3	37.3	38.2	38.8	33.9	34.4	35.3	36.3	37.3	38.2	38.8		
Height (cm)	86.1	87.4	89.6	92.1	93.7	97.1	98.3	86.1	87.4	89.6	92.1	93.7	94.7	97.1		
50 th	87	87	88	89	89	90	91	43	43	44	44	45	46	46		
90 th	100	100	101	102	103	103	104	55	55	56	56	57	58	58		
95 th	104	105	105	106	107	107	108	57	58	58	59	60	61	61		
95 th + 12 mmHg	116	117	117	118	119	119	120	69	70	70	71	72	73	73		
3 years																
Height (in)	36.4	37.0	37.9	39.0	40.1	41.1	41.7	36.4	37.0	37.9	39.0	40.1	41.1	41.7		
Height (cm)	92.5	93.9	96.3	99.0	101.8	104.3	105.8	92.5	93.9	96.3	99.0	101.8	104.3	105.8		
50 th	88	89	90	90	91	92	92	46	46	47	47	48	49	49		
90 th	103	102	102	103	104	105	105	58	58	59	59	60	61	61		
95 th	106	106	107	107	108	109	109	60	61	61	62	63	64	64		
95 th + 12 mmHg	118	118	119	119	120	121	121	72	73	73	74	75	76	76		
4 years																
Height (in)	38.8	39.4	40.5	41.7	42.9	43.9	44.5	38.8	39.4	40.5	41.7	42.9	43.9	44.5		
Height (cm)	98.5	100.2	102.9	105.9	108.9	111.5	113.2	98.5	100.2	102.9	105.9	108.9	111.5	113.2		
50 th	90	91	92	92	94	94	94	48	49	49	50	51	51	51		
90 th	102	103	104	105	106	106	107	60	60	61	62	63	64	64		
95 th	107	107	108	108	109	110	110	63	64	65	65	66	67	67		
95 th + 12 mmHg	119	119	120	120	121	122	122	75	76	77	78	79	79	80		
5 years																
Height (in)	41.1	41.8	43.0	44.3	45.5	46.7	47.4	41.1	41.8	43.0	44.3	45.5	46.7	47.4		
Height (cm)	104.4	106.2	109.1	112.4	115.7	118.6	120.3	104.4	106.2	109.1	112.4	115.7	118.6	120.3		
50 th	91	92	94	94	95	96	96	51	51	52	53	54	55	55		
90 th	103	104	105	106	107	108	108	63	64	65	65	66	67	67		
95 th	107	107	108	109	109	110	111	66	67	68	68	69	70	70		
95 th + 12 mmHg	119	120	121	121	122	123	124	78	79	80	81	82	82	83		
6 years																
Height (in)	43.4	44.2	45.4	46.6	48.2	49.4	50.2	43.4	44.2	45.4	46.6	48.2	49.4	50.2		
Height (cm)	110.2	112.2	115.2	118.9	122.4	125.9	127.9	110.2	112.2	115.2	118.9	122.4	125.9	127.9		
50 th	93	93	94	95	96	97	98	54	54	55	56	57	57	58		
90 th	105	105	106	107	109	110	110	66	67	68	69	69	70	70		
95 th	109	109	110	111	112	113	114	69	70	71	72	72	73	73		
95 th + 12 mmHg	121	121	122	122	123	124	125	81	82	82	83	84	84	85		
7 years																
Height (in)	45.7	46.5	47.8	49.3	50.8	52.1	52.9	45.7	46.5	47.8	49.3	50.8	52.1	52.9		
Height (cm)	116.1	118.0	121.4	125.1	128.9	132.4	134.3	116.1	118.0	121.4	125.1	128.9	132.4	134.3		
50 th	94	94	95	97	98	98	97	56	56	57	58	59	59	59		
90 th	107	107	108	109	110	111	111	68	68	69	70	70	71	71		
95 th	110	110	111	112	114	115	116	71	71	72	73	73	74	74		
95 th + 12 mmHg	122	122	123	124	126	127	128	83	83	84	85	86	86	87		
8 years																
Height (in)	47.8	48.6	50.0	51.6	53.2	54.6	55.5	47.8	48.6	50.0	51.6	53.2	54.6	55.5		
Height (cm)	121.4	123.5	127.0	131.0	135.1	138.8	141.0	121.4	123.5	127.0	131.0	135.1	138.8	141.0		
50 th	96	97	98	99	99	99	99	57	57	58	59	60	60	60		
90 th	107	108	109	110	111	112	112	69	70	71	72	72	73	73		
95 th	111	112	112	114	115	116	117	72	73	74	74	75	75	75		
95 th + 12 mmHg	123	124	124	126	127	128	129	84	85	85	86	87	87	87		
9 years																
Height (in)	49.6	50.5	52.0	53.7	55.4	56.9	57.9	49.6	50.5	52.0	53.7	55.4	56.9	57.9		
Height (cm)	126.0	128.3	132.1	136.3	140.7	144.7	147.1	126.0	128.3	132.1	136.3	140.7	144.7	147.1		
50 th	97	97	98	99	99	100	101	57	58	59	60	61	62	62		
90 th	109	109	109	110	112	113	114	70	71	72	73	74	74	74		
95 th	112	112	113	115	116	118	119	74	74	75	76	76	77	77		
95 th + 12 mmHg	124	124	125	126	127	129	130	86	86	87	88	88	89	89		
10 years																
Height (in)	51.3	52.2	53.8	55.8	57.4	59.1	60.1	51.3	52.2	53.8	55.8	57.4	59.1	60.1		
Height (cm)	130.2	132.7	136.7	141.3	145.8	150.1	152.7	130.2	132.7	136.7	141.3	145.8	150.1	152.7		
50 th	97	98	99	99	100	101	102	59	60	61	62	63	63	64		
90 th	108	109	111	112	113	115	116	72	73	74	75	75	76	76		
95 th	112	112	114	116	118	120	121	76	76	77	77	78	78	78		
95 th + 12 mmHg	124	125	126	128	130	132	133	88	88	89	89	90	90	90		
11 years																
Height (in)	53.0	54.0	55.7	57.6	59.6	61.3	62.4	53.0	54.0	55.7	57.6	59.6	61.3	62.4		
Height (cm)	134.7	137.3	141.5	146.4	151.3	155.8	158.6	134.7	137.3	141.5	146.4	151.3	155.8	158.6		
50 th	99	99	100	102	103	104	106	61	61	62	63	63	63	63		
90 th	111	111	112	114	116	117	118	74	74	75	75	76	76	76		
95 th	114	114	116	118	120	123	124	77	78	78	79	79	79	79		
95 th + 12 mmHg	126	126	128	130	132	135	136	89	90	90	90	90	90	90		
12 years																
Height (in)	55.2	56.3	58.1	60.1	62.2	64.0	65.2	55.2	56.3	58.1	60.1	62.2	64.0	65.2		
Height (cm)	140.3	143.0	147.5	152.7	157.9	162.6	165.5	140.3	143.0	147.5	152.7	157.9	162.6	165.5		
50 th	101	101	102	104	106	108	109	61	62	63	63	63	63	63		
90 th	113	114	115	117	119	121	122	73	73	75	75	75	76	76		
95 th	116	117	118	121	124	126	128	76	76	78	78	78	79	79		
95 th + 12 mmHg	128	129	130	133	136	139	140	90	90	90	90	90	91	91		
13 years																
Height (in)	57.9	59.1	61.0	63.1	65.2	67.1	68.3	57.9	59.1	61.0	63.1	65.2	67.1	68.3		
Height (cm)	147.0	150.0	154.9	160.3	165.7	170.5	172.4	147.0	150.0	154.9	160.3	165.7	170.5	172.4		
50 th	103	104	106	108	110	112	111	61	62	63	63	63	63	63		
90 th	115	116	118	121	124	126	126	74	74	75	75	76	77	77		
95 th	119	120	122	125	128	130	131	78	78	79	80	80	81	81		
95 th + 12 mmHg	131	132	134	137	140	142	143	90	90	90	90	92	93	93		
14 years																
Height (in)	60.6	61.8	63.8	65.9	68.0	69.8	70.9	60.6	61.8	63.8	65.9	68.0	69.8	70.9		
Height (cm)	153.8	156.0	161.0	167.3	172.7	177.8	180.1	153.8	156.0	161.0	167.3	172.7	177.8	180.1		
50 th	105	106	108	111	112	113	113	60	60	62	63	64	65	65		
90 th	119	120	123	126	129	132	132	74	74	75	77	78	79	80		
95 th	123	125	127	130	133	136	137	78	78	81	83	83	84	84		
95 th + 12 mmHg	135	137	139	142	144	145	146	89	90	91	93	94	95	95		
15 years																
Height (in)	63.6	63.8	65.7	67.8	69.8	71.5	72.5	63.6	63.8	65.7	67.8	69.8	71.5	72.5		
Height (cm)	159.0	162.0	166.9	172.2	177.2	181.6	184.2	159.0	162.0	166.9	172.2	177.2	181.6	184.2		
50 th	108	109	112	113	114	114	114	61	62	64	65	66	67	68		
90 th	123	126	128	130	132	134	135	78	79	81	83	84	85	85		
95 th	127	129	131	133	135	137	138	81	83	84	85	85	86	86		
95 th + 12 mmHg	139	141	143	146	148	149	1									

Blood pressure levels for girls by age and height percentile

BP (percentile)	Systolic BP (mmHg)								Diastolic BP (mmHg)							
	Height percentile or measured height								Height percentile or measured height							
	5%	10%	25%	50%	75%	90%	95%	5%	10%	25%	50%	75%	90%	95%		
1 year																
Height (in)	29.7	30.2	30.9	31.8	32.7	33.4	33.9	29.7	30.2	30.9	31.8	32.7	33.4	33.9		
Height (cm)	75.4	76.6	78.6	80.8	83.0	84.9	86.1	75.4	76.6	78.6	80.8	83.0	84.9	86.1		
50 th	84	85	86	88	89	90	91	84	85	86	88	89	90	91		
90 th	98	99	99	100	101	102	103	98	99	99	100	101	102	103		
95 th	101	102	102	103	104	105	105	99	99	99	100	101	102	103		
95 th + 12 mmHg	113	114	114	115	116	117	117	113	114	114	115	116	117	117		
2 years																
Height (in)	33.4	34.0	34.9	35.9	36.9	37.8	38.4	33.4	34.0	34.9	35.9	36.9	37.8	38.4		
Height (cm)	84.9	86.3	88.6	91.1	93.7	96.0	97.4	84.9	86.3	88.6	91.1	93.7	96.0	97.4		
50 th	87	87	88	89	90	91	91	87	87	88	89	90	91	91		
90 th	101	101	103	103	104	105	106	98	98	99	100	101	102	103		
95 th	104	105	106	106	107	108	109	102	103	103	104	105	106	106		
95 th + 12 mmHg	116	117	118	118	119	120	121	116	117	117	118	119	120	121		
3 years																
Height (in)	35.8	36.4	37.3	38.4	39.6	40.6	41.2	35.8	36.4	37.3	38.4	39.6	40.6	41.2		
Height (cm)	91.0	92.4	94.9	97.6	100.5	103.1	104.6	91.0	92.4	94.9	97.6	100.5	103.1	104.6		
50 th	88	88	89	90	90	91	91	88	88	89	90	90	91	91		
90 th	102	103	104	104	105	106	107	98	98	99	100	101	102	103		
95 th	106	106	107	108	109	110	110	102	103	103	104	105	106	106		
95 th + 12 mmHg	118	118	119	120	121	122	122	118	119	119	120	121	122	122		
4 years																
Height (in)	38.3	38.9	39.9	41.1	42.4	43.3	44.2	38.3	38.9	39.9	41.1	42.4	43.3	44.2		
Height (cm)	97.2	98.8	101.4	104.5	107.6	110.5	112.2	97.2	98.8	101.4	104.5	107.6	110.5	112.2		
50 th	89	89	90	91	90	91	91	89	89	90	91	90	91	91		
90 th	103	104	105	106	107	108	108	98	98	99	100	101	102	103		
95 th	107	108	109	109	110	111	112	100	100	101	102	103	104	104		
95 th + 12 mmHg	119	120	121	121	122	123	123	119	120	120	121	122	123	123		
5 years																
Height (in)	40.8	41.5	42.6	43.9	45.2	46.3	47.3	40.8	41.5	42.6	43.9	45.2	46.3	47.3		
Height (cm)	103.6	105.3	108.2	111.5	114.9	116.3	120.0	103.6	105.3	108.2	111.5	114.9	116.3	120.0		
50 th	90	90	91	92	92	93	93	90	91	92	92	93	93	93		
90 th	104	105	106	107	108	109	110	94	94	95	96	97	98	99		
95 th	108	109	109	110	111	112	113	98	98	99	100	101	102	103		
95 th + 12 mmHg	120	121	121	122	123	124	125	120	121	121	122	123	124	125		
6 years																
Height (in)	43.3	44.0	45.2	46.6	48.1	49.4	50.3	43.3	44.0	45.2	46.6	48.1	49.4	50.3		
Height (cm)	110.0	111.8	114.8	118.4	122.1	125.6	127.7	110.0	111.8	114.8	118.4	122.1	125.6	127.7		
50 th	92	92	93	94	94	95	97	92	92	93	94	94	95	97		
90 th	105	106	107	108	109	110	111	97	97	98	99	100	101	102		
95 th	109	109	110	111	112	113	114	101	101	102	103	104	105	106		
95 th + 12 mmHg	121	121	122	123	124	125	126	121	121	122	123	124	125	126		
7 years																
Height (in)	45.6	46.4	47.7	49.2	50.7	52.1	53.0	45.6	46.4	47.7	49.2	50.7	52.1	53.0		
Height (cm)	115.9	117.8	121.6	124.9	128.5	133.7	134.7	115.9	117.8	121.6	124.9	128.5	133.7	134.7		
50 th	92	93	94	95	95	97	98	92	93	94	95	95	97	98		
90 th	106	106	107	109	110	111	112	98	98	99	100	101	102	103		
95 th	109	110	111	112	113	114	115	101	101	102	103	104	105	106		
95 th + 12 mmHg	121	122	123	124	125	126	127	121	122	122	123	124	125	126		
8 years																
Height (in)	47.6	48.4	49.8	51.4	53.0	54.5	55.5	47.6	48.4	49.8	51.4	53.0	54.5	55.5		
Height (cm)	121.0	123.0	126.5	130.6	134.7	138.9	140.9	121.0	123.0	126.5	130.6	134.7	138.9	140.9		
50 th	93	94	95	97	98	99	100	93	94	95	97	98	99	100		
90 th	107	107	108	110	111	112	113	99	99	100	101	102	103	104		
95 th	110	111	112	113	114	115	116	102	102	103	104	105	106	107		
95 th + 12 mmHg	122	123	124	125	126	127	128	122	123	123	124	125	126	127		
9 years																
Height (in)	49.3	50.2	51.7	53.4	55.1	56.7	57.9	49.3	50.2	51.7	53.4	55.1	56.7	57.9		
Height (cm)	125.3	127.6	131.3	135.6	140.1	144.1	146.6	125.3	127.6	131.3	135.6	140.1	144.1	146.6		
50 th	95	95	97	98	99	100	101	95	95	97	98	99	100	101		
90 th	108	108	109	111	112	113	114	101	101	102	103	104	105	106		
95 th	112	112	113	114	115	116	117	104	104	105	106	107	108	109		
95 th + 12 mmHg	124	124	125	126	127	128	130	124	124	125	126	127	128	129		
10 years																
Height (in)	51.1	52.0	53.7	55.5	57.4	59.1	60.2	51.1	52.0	53.7	55.5	57.4	59.1	60.2		
Height (cm)	129.7	132.2	136.3	141.0	145.8	150.2	152.8	129.7	132.2	136.3	141.0	145.8	150.2	152.8		
50 th	96	97	98	99	100	102	103	96	97	98	99	100	101	102		
90 th	109	110	111	112	113	115	116	102	102	103	104	105	106	107		
95 th	113	114	114	115	116	117	118	106	106	107	108	109	110	111		
95 th + 12 mmHg	125	126	126	128	129	131	132	125	126	126	128	129	130	131		
11 years																
Height (in)	53.4	54.5	56.2	58.2	60.2	61.9	63.0	53.4	54.5	56.2	58.2	60.2	61.9	63.0		
Height (cm)	135.6	138.3	142.8	147.8	152.8	157.3	160.0	135.6	138.3	142.8	147.8	152.8	157.3	160.0		
50 th	98	99	101	102	104	105	106	98	99	101	102	104	105	106		
90 th	111	112	113	114	116	117	118	104	104	105	106	107	108	109		
95 th	115	116	117	118	119	120	121	108	108	109	110	111	112	113		
95 th + 12 mmHg	127	128	129	130	132	135	136	127	128	128	129	130	131	132		
12 years																
Height (in)	56.2	57.3	59.0	60.9	62.8	64.5	65.5	56.2	57.3	59.0	60.9	62.8	64.5	65.5		
Height (cm)	142.8	145.3	149.9	154.8	159.6	163.8	166.4	142.8	145.3	149.9	154.8	159.6	163.8	166.4		
50 th	102	102	104	105	107	108	109	102	102	104	105	107	108	109		
90 th	114	115	116	118	120	121	122	106	106	107	108	109	110	111		
95 th	118	119	120	122	124	125	126	110	110	111	112	113	114	115		
95 th + 12 mmHg	130	131	132	134	136	139	140	130	131	132	134	136	139	140		
13 years																
Height (in)	58.3	59.3	60.9	62.7	64.5	66.1	67.0	58.3	59.3	60.9	62.7	64.5	66.1	67.0		
Height (cm)	148.1	150.6	154.7	159.2	163.7	167.8	170.2	148.1	150.6	154.7	159.2	163.7	167.8	170.2		
50 th	104	104	106	107	108	109	110	104	104	106	107	108	109	110		
90 th	116	117	119	121	122	123	123	107	107	109	110	111	112	113		
95 th	121	121	123	124	126	126	126	112	112	114	115	116	117	118		
95 th + 12 mmHg	133	134	135	136	138	140	141	133	134	135	136	138	140	141		
14 years																
Height (in)	59.3	60.2	61.8	63.5	65.2	66.8	67.7	59.3	60.2	61.8	63.5	65.2	66.8	67.7		
Height (cm)	150.8	152.9	156.9	161.3	165.7	169.7	171.1	150.8	152.9	156.9	161.3	165.7	169.7	171.1		
50 th	105	105	107	109	109	109	109	105	105	107	109	109	109	109		
90 th	118	119	120	122	123	123	123	108	108	110	111	112	112	112		
95 th	123	123	124	125	126	127	127	112	112	114	115	116				

How To Use the BP Tables

Use the standard height charts to determine the height percentile

Measure and record the child's SBP and DBP

Use the correct gender table for SBP and DBP

Find the child's age on the left side of the table

Follow the age row horizontally across the table to the intersection of the line for the height percentile (vertical column).

TABLE 4 Continued

Age (y)	BP Percentile	SBP (mm Hg)						
		Height Percentile or Measured Height						
		5%	10%	25%	50%	75%	90%	95%
8	Height (in)	47.8	48.6	50	51.6	53.2	54.6	55.5
	Height (cm)	121.4	123.5	127	131	135.1	138.8	141
	50th	95	96	97	98	99	99	100
	90th	107	108	109	110	111	112	112
	95th	111	112	112	114	115	116	117
	95th + 12 mm Hg	123	124	124	126	127	128	129
		DBP (mm Hg)						
		Height Percentile or Measured Height						
		5%	10%	25%	50%	75%	90%	95%
		47.8	48.6	50	51.6	53.2	54.6	55.5
		121.4	123.5	127	131	135.1	138.8	141
8	Height (in)	57	57	58	59	59	60	60
	Height (cm)	69	70	70	71	72	72	73
	50th	72	73	73	74	75	75	75
	90th	84	85	85	86	87	87	87
	95th	88	89	89	90	91	91	92
	95th + 12 mm Hg	100	101	101	102	103	103	104


TABLE 4 BP Levels for Boys by Age and Height Percentile

Age (y)	BP Percentile	SBP (mm Hg)							DBP (mm Hg)						
		Height Percentile or Measured Height							Height Percentile or Measured Height						
		5%	10%	25%	50%	75%	90%	95%	5%	10%	25%	50%	75%	90%	95%
1	Height (in)	30.4	30.8	31.6	32.4	33.3	34.1	34.6	30.4	30.8	31.6	32.4	33.3	34.1	34.6
	Height (cm)	77.2	78.3	80.2	82.4	84.6	86.7	87.9	77.2	78.3	80.2	82.4	84.6	86.7	87.9
	50th	85	85	86	86	87	88	88	40	40	40	41	41	42	42
	90th	98	99	99	100	100	101	101	52	52	53	53	54	54	54
	<u>95th</u>	102	102	103	103	104	105	105	54	54	55	55	56	57	57
	95th + 12 mm Hg	114	114	115	115	116	117	117	66	66	67	67	68	69	69
2	Height (in)	33.9	34.4	35.3	36.3	37.3	38.2	38.8	33.9	34.4	35.3	36.3	37.3	38.2	38.8
	Height (cm)	86.1	87.4	89.6	92.1	94.7	97.1	98.5	86.1	87.4	89.6	92.1	94.7	97.1	98.5
	50th	87	87	88	89	89	90	91	43	43	44	44	45	46	46
	90th	100	100	101	102	103	103	104	55	55	56	56	57	58	58
	95th	104	105	105	106	107	107	108	57	58	58	59	60	61	61
	95th + 12 mm Hg	116	117	117	118	119	119	120	69	70	70	71	72	73	73
3	Height (in)	36.4	37	37.9	39	40.1	41.1	41.7	36.4	37	37.9	39	40.1	41.1	41.7
	Height (cm)	92.5	93.9	96.3	99	101.8	104.3	105.8	92.5	93.9	96.3	99	101.8	104.3	105.8
	50th	88	89	89	90	91	92	92	45	46	46	47	48	49	49
	<u>90th</u>	101	102	102	103	104	105	<u>105</u>	58	58	59	59	60	61	<u>61</u>
	<u>95th</u>	106	106	107	<u>107</u>	108	109	109	60	61	61	<u>62</u>	63	64	64
	95th + 12 mm Hg	118	118	119	119	120	121	121	72	73	73	74	75	76	76

Children with systolic BP (SBP) or diastolic BP (DBP) that exceeds screening thresholds for age and sex require further evaluation, starting with repeat BP measurement

Screening BP Values Requiring Further Evaluation				
Age, y	BP, mm Hg			
	Boys		Girls	
	Systolic	DBP	Systolic	BP
1	98	52	98	54
2	100	55	101	58
<u>3</u>	<u>101</u>	<u>58</u>	102	60
4	102	60	103	62
5	103	63	104	64
6	105	66	105	67
<u>7</u>	<u>106</u>	<u>68</u>	<u>106</u>	<u>68</u>
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

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