Hypertension in the community- Everyday best practice and red flags

Aviva Goldberg MD MA
December 15 2022

University of Manitoba

Objectives

- Understand how to measure blood pressure in children
- Identify what is a high blood pressure, and what could be causing it
- Determine how and when referral to pediatric nephrology for hypertension management is appropriate

Case 1

- A 13 year old boy comes to his primary care provider for assessment/management of his medications
- He is on methylphenidate for ADHD; it is working well at the current dose
- His blood pressure is 134/86; his mother worries that by continuing the medication his kidneys, brain and heart will suffer damage from hypertension
- **Should his medication be stopped/changed?**

Case 2

- A 16 year old girl presents to her primary care pediatrician for evaluation of amenorrhea
- She lacks secondary sexual characteristics (Tanner stage 1)
- Initial vital signs:
  - BP 170/120
  - HR 95 bpm
  - RR 20
- She is asymptomatic
- **What might tie the amenorrhea and BP together? What tests could be performed at this time?**

Case 3

- A 5 year old boy comes for a primary care visit “checkup” and vaccination
- His blood pressure is 145/110
- He has been previously well, though parents note he does not keep up as well with sports as his older siblings
- **What physical exam findings may be helpful at this point to help make a diagnosis?**

Case 4

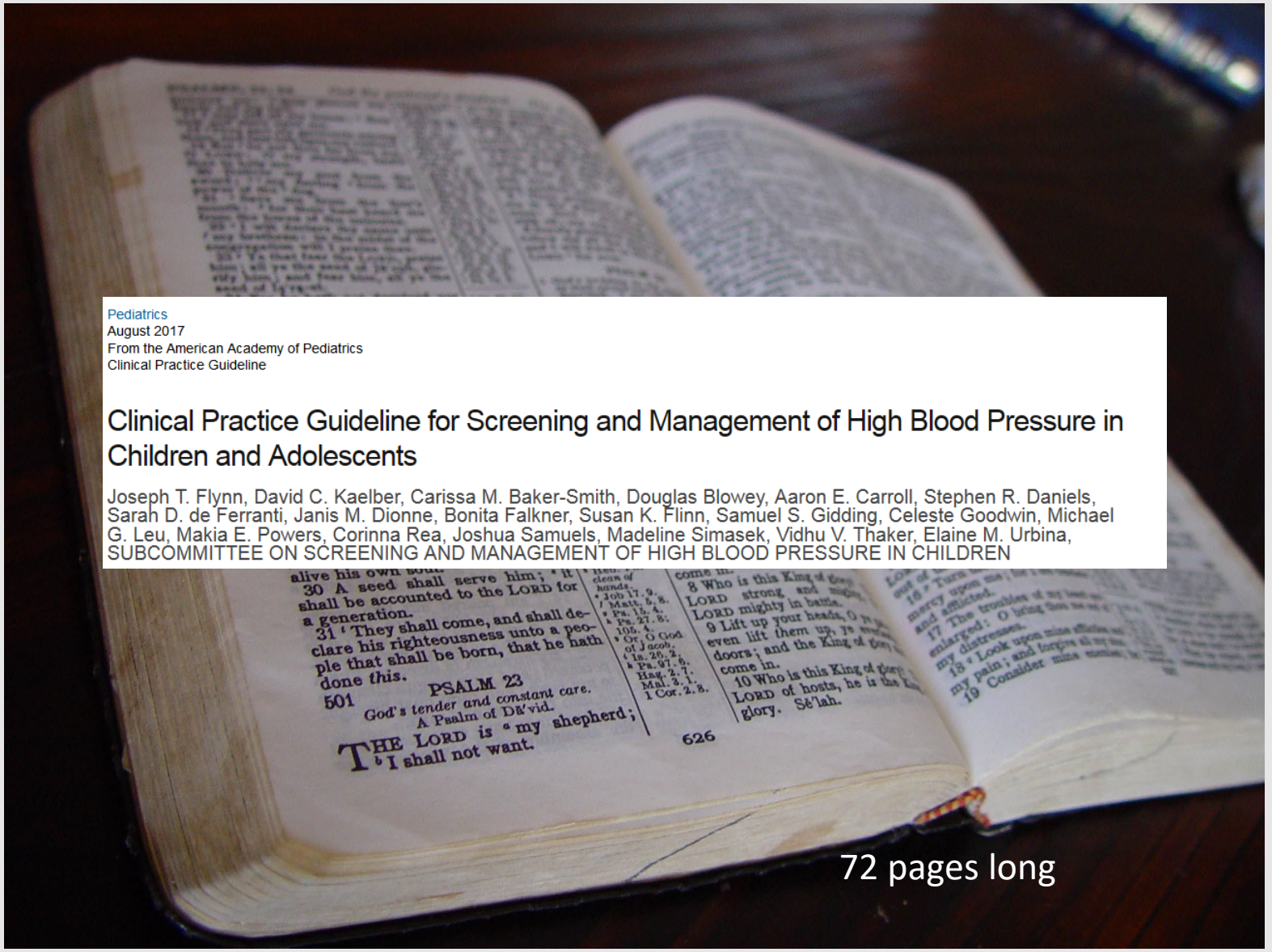
- A 9 year old girl comes for assessment as part of her primary care “checkup”
- She is 131 cm tall and weighs 58 kg, her BMI is 33.8 kg/m2
- Her BP is 119/76
- Food security is a longstanding issue for her family who rely on EI
- The family often relies on the food bank for assistance, and the increasing costs of staple goods has made this worse
- **How can you help this child?**

What should you do in these cases?

What should you avoid?

What Resources can Help?

When Should You Refer?

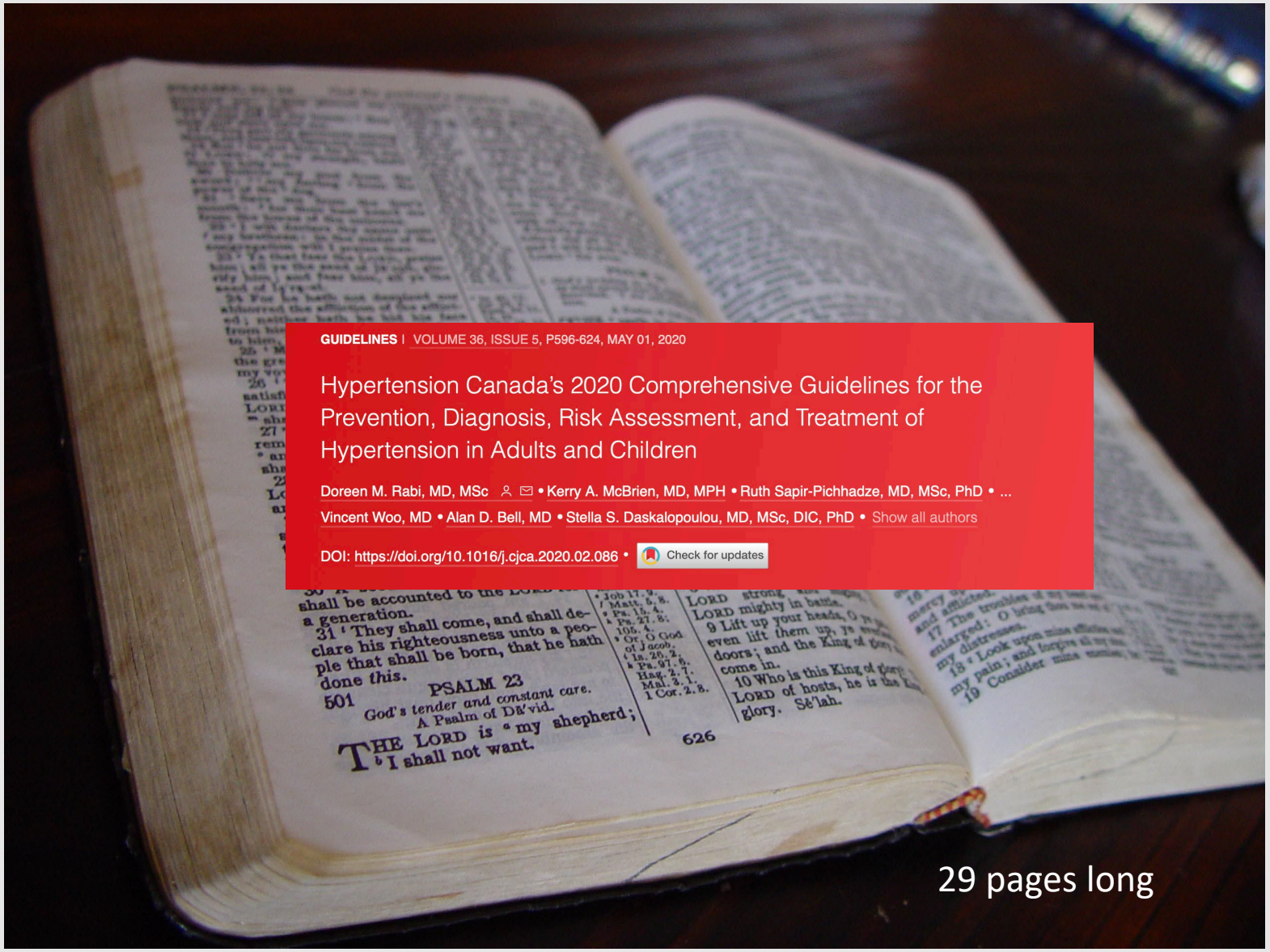


Pediatrics
August 2017
From the American Academy of Pediatrics
Clinical Practice Guideline

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

Joseph T. Flynn, David C. Kaelber, Carissa M. Baker-Smith, Douglas Blowey, Aaron E. Carroll, Stephen R. Daniels, Sarah D. de Ferranti, Janis M. Dionne, Bonita Falkner, Susan K. Flinn, Samuel S. Gidding, Celeste Goodwin, Michael G. Leu, Makia E. Powers, Corinna Rea, Joshua Samuels, Madeline Simasek, Vidhu V. Thaker, Elaine M. Urbina, SUBCOMMITTEE ON SCREENING AND MANAGEMENT OF HIGH BLOOD PRESSURE IN CHILDREN

72 pages long


GUIDELINES | VOLUME 36, ISSUE 5, P596-624, MAY 01, 2020
Hypertension Canada's 2020 Comprehensive Guidelines for the Prevention, Diagnosis, Risk Assessment, and Treatment of Hypertension in Adults and Children
Doreen M. Rabi, MD, MSc • Kerry A. McBrien, MD, MPH • Ruth Sapir-Pichhadze, MD, MSc, PhD • ...
Vincent Woo, MD • Alan D. Bell, MD • Stella S. Daskalopoulou, MD, MSc, DIC, PhD • Show all authors
DOI: https://doi.org/10.1016/j.cjca.2020.02.086 •
Check for updates
29 pages long

Pediatrics
August 2017
From the American Academy of Pediatrics
Clinical Practice Guideline

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

Joseph T. Flynn, David C. Kaelber, Carissa M. Baker-Smith, Douglas Blowey, Aaron E. Carroll, Stephen R. Daniels, Sarah D. de Ferranti, Janis M. Dionne, Bonita Falkner, Susan K. Flinn, Samuel S. Gidding, Celeste Goodwin, Michael G. Leu, Makia E. Powers, Corinna Rea, Joshua Samuels, Madeline Simasek, Vidhu V. Thaker, Elaine M. Urbina, SUBCOMMITTEE ON SCREENING AND MANAGEMENT OF HIGH BLOOD PRESSURE IN CHILDREN

GUIDELINES | VOLUME 36, ISSUE 5, P596-624, MAY 01, 2020

Hypertension Canada's 2020 Comprehensive Guidelines for the Prevention, Diagnosis, Risk Assessment, and Treatment of Hypertension in Adults and Children

Doreen M. Rabi, MD, MSc • Kerry A. McBrien, MD, MPH • Ruth Sapir-Pichhadze, MD, MSc, PhD • ... Vincent Woo, MD • Alan D. Bell, MD • Stella S. Daskalopoulou, MD, MSc, DIC, PhD • Show all authors

DOI: https://doi.org/10.1016/j.cjca.2020.02.086 • Check for updates

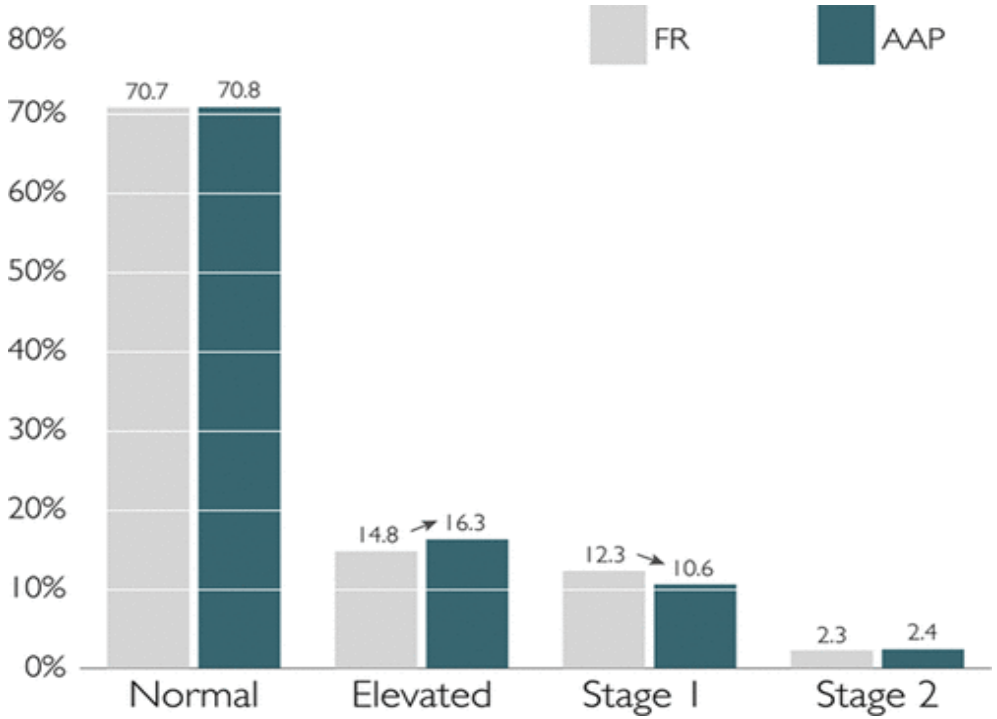
What is hypertension and how often will I see it?

Definition

1. Normal BP: BP <90th percentile for age, sex, and height; or <120/<80 mm Hg for adolescents ≥13 years old
2. Elevated BP: BP reading ≥90th percentile and <95th percentile for age, sex, and height; or 120 to 129/<80 mm Hg for adolescents ≥13 years old;
3. Hypertension: BP ≥95th percentile for age, sex, and height; or ≥130/80 mm Hg for adolescents ≥13 years old. Hypertensive-level BP is further staged as follows:
    1. Stage 1 hypertension: BP ≥95th percentile for age, sex, and height to <95th percentile+12 mm Hg; or 130 to 139/80 to 89 mm Hg for adolescents ≥13 years of age
    2. Stage 2 hypertension: BP ≥95th percentile+12 mm Hg for age, sex, and height; or >140/90 mm Hg for adolescents ≥13 years of age.

Prevalence

- 3.1% elevated BP and 1.4% hypertension (per StatsCan 2010)



Cynthia S. Bell. Hypertension. Prevalence of Hypertension in Children, Volume: 73, Issue: 1, Pages: 148-152, DOI: (10.1161/HYPERTENSIONAHA.118.11673)

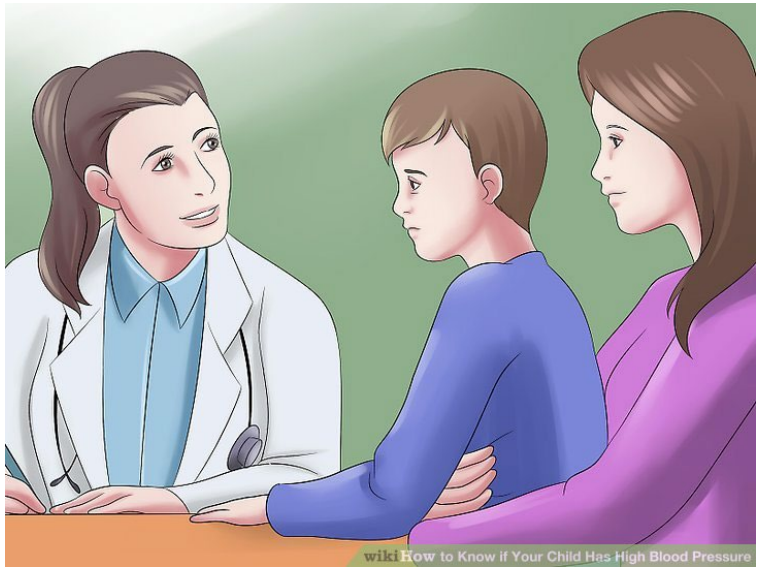
Measuring blood pressure

Who should be checked?

- ANNUALLY in all children ≥ 3 years old
- EVERY health care encounter if they have obesity, are taking medications known to increase BP, have renal disease, a history of aortic arch obstruction or coarctation, or diabetes

BP Measurement Technique

- The child should be seated in a quiet room for 3–5 min before measurement, with the back supported and feet uncrossed on the floor.

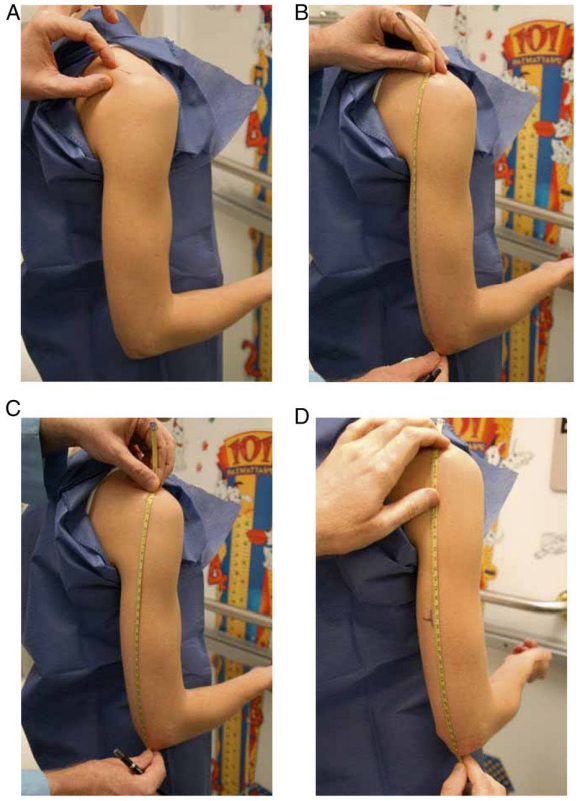


BP Measurement Technique

- measured in the right arm for consistency
- should be at heart level, supported, and uncovered above the cuff.
- patient and observer should not speak while the measurement is being taken.
- CDN guidelines- avoid stimulant medication before assessment *

BP Measurement Technique

- bladder length- 80%–100% of the circumference of the arm
- width should be at least 40% of the arm circumference
- **Between sizes? Go UP**



BP Measurement don’ts

- In the leg (aside from 4 limb)
- In the wrist
- In a machine at the pharmacy
- In a child who cannot sit at all still

Blood Pressure Levels for Boys by Age and Height Percentile

Age (Year)	BP Percentile ↓	Systolic BP (mmHg) ← Percentile of Height →							Diastolic BP (mmHg) ← Percentile of Height →						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
1	50th	80	81	83	85	87	88	89	34	35	36	37	38	39	39
	90th	94	95	97	99	100	102	103	49	50	51	52	53	53	54
	95th	98	99	101	103	104	106	106	54	54	55	56	57	58	58
	99th	105	106	108	110	112	113	114	61	62	63	64	65	66	66
2	50th	84	85	87	88	90	92	92	39	40	41	42	43	44	44
	90th	97	99	100	102	104	105	106	54	55	56	57	58	58	59
	95th	101	102	104	106	108	109	110	59	59	60	61	62	63	63
	99th	109	110	111	113	115	117	117	66	67	68	69	70	71	71
3	50th	86	87	89	91	93	94	95	44	44	45	46	47	48	48
	90th	100	101	103	105	107	108	109	59	59	60	61	62	63	63
	95th	104	105	107	109	110	112	113	63	63	64	65	66	67	67
	99th	111	112	114	116	118	119	120	71	71	72	73	74	75	75
4	50th	88	89	91	93	95	96	97	47	48	49	50	51	51	52
	90th	102	103	105	107	109	110	111	62	63	64	65	66	66	67
	95th	106	107	109	111	112	114	115	66	67	68	69	70	71	71
	99th	113	114	116	118	120	121	122	74	75	76	77	78	78	79
5	50th	90	91	93	95	96	98	98	50	51	52	53	54	55	55
	90th	104	105	106	108	110	111	112	65	66	67	68	69	69	70
	95th	108	109	110	112	114	115	116	69	70	71	72	73	74	74
	99th	115	116	118	120	121	123	123	77	78	79	80	81	81	82

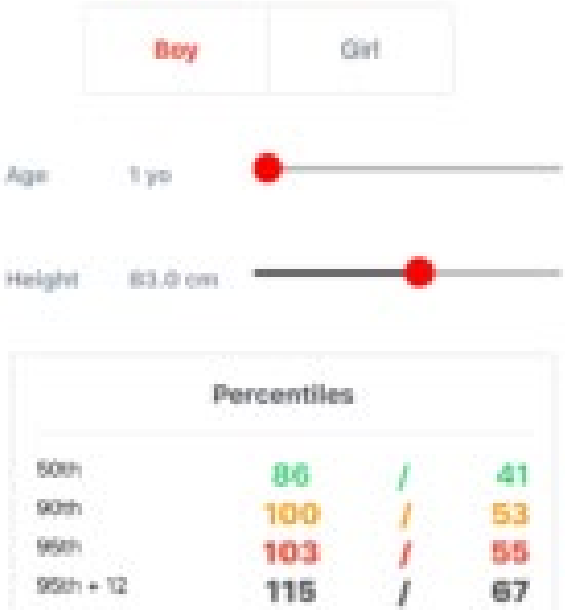
“None of this is Feasible in My Busy Office!”

Simplified table

Table 4 Classification of blood pressure in children and adolescents

For Children Aged 1 to 13 Years	For Children Aged ≥13 Years
Normal BP: <90th percentile	Normal BP: <120/<80 mmHg
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

BP App



University of Manitoba

Determining the cause- key to therapy

Important History Points

- Gross hematuria, obstructive symptoms (something kidney)
- Preceding streptococcal infection (skin or throat)
- Medications Inc. stimulants, illicit drugs (e.g.. PCP) and OTC (e.g.. Cold meds)
- Weight loss, anxiety, heat intolerance (thyroid)
- Pregnancy- should be ruled out in any postmenarchal female

Important history points

- Amenorrhea (something hormonal)
- Trauma, including non accidental
- Sweating, anxiety, “impending doom”
- Constitutional symptoms (epistaxis, hemoptysis, oral ulcers, arthritis)

- Exercise tolerance (something cardiac)

Physical Examination

- Proper BP measurement
- Vital signs
- 4 limb BP
- Fundoscopic exam
- Thyroid exam
- Heart exam
- Renal bruit
- Edema
- BF delay
- Peripheral edema
- Abdominal mass
- Skin exam for signs of NF
- Toxidromes suggesting drug use
- Evidence of trauma/ child abuse

Diagnostic testing

- Routine tests:
  - Blood chemistry (sodium, potassium, chloride, total CO_2, and creatinine; Grade D);
  - Serum total cholesterol and HDL cholesterol, low-density lipoprotein cholesterol, non-HDL cholesterol, and triglycerides (Grade C; **revised recommendation**).
  - Urinalysis (Grade D); and Albumin/creatinine ratio (first morning; Grade D).

Diagnostic Testing

- Standard tests (CDN and US recs differ)
  - Renal ultrasound (Grade D); (AAP normal-weight children and adolescents ≥8 years of age who are suspected of having renovascular HTN)
  - Echocardiogram (Grade C); (AAP for “consideration of antihypertensives”)
  - Retinal examination (Grade C) (AAP no recs)

Treatment of hypertension

Treatment

- Initial therapy should be monotherapy.i.Recommended monotherapy choices are:
  - a.An ACE inhibitor (Grade C);
  - b.An ARB (Grade C); or
  - c.A long-acting dihydropyridine CCB (Grade D).
- If BP goals are not achieved with standard-dose monotherapy for ≥ 6 months, children should be referred to an expert in pediatric hypertension (Grade D).
- The treatment goal is office BP (systolic and diastolic) < 95th percentile (Grade D). The goal for ABPM is BP (systolic and diastolic) < 95th percentile (Grade D).
- For patients with risk factors or target organ damage the goal is BP (systolic and diastolic) < 90th percentile (Grade D).

DASH Diet and Physical activity

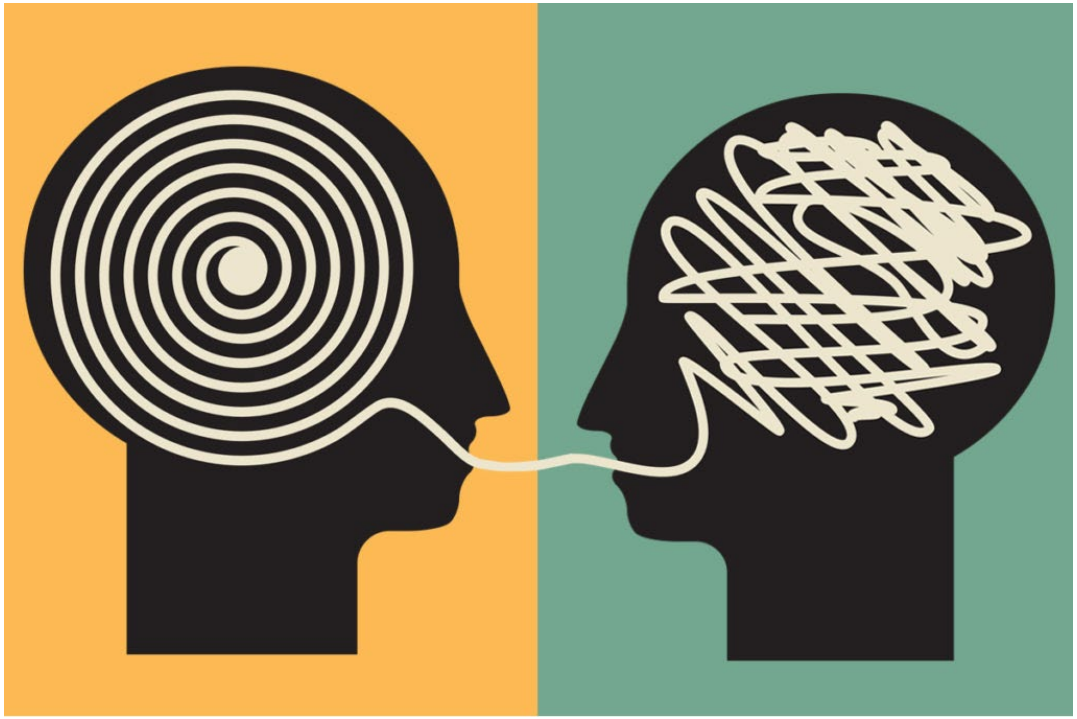
- At the time of diagnosis of elevated BP or HTN in a child or adolescent, clinicians should provide advice on the DASH diet and recommend moderate to vigorous physical activity at least 3 to 5 days per week (30–60 minutes per session) to help reduce BP (grade C, weak recommendation). (AAP **Key Action Statement 20)**

DASH Diet

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

The Importance of Motivational Interviewing



umanitoba.ca

University of Manitoba


MOTIVATIONAL INTERVIEWING
R
RESIST telling them what to do:
Avoid telling, directing, or convincing your friend about the right path to good health.
U
UNDERSTAND their motivation:
Seek to understand their values, needs, abilities, motivations and potential barriers to changing behaviors.
L
LISTEN with empathy:
Seek to understand their values, needs, abilities, motivations and potential barriers to changing behaviors.
E
EMPOWER them:
Work with your friends to set achievable goals and to identify techniques to overcome barriers.

Hypertensive Emergencies

- A severe symptomatic elevation in BP WITH evidence of acute target organ damage
- End organ damage:
  - brain (seizures, increased intracranial pressure)
  - kidneys (renal insufficiency)
  - eyes (papilledema, retinal hemorrhages, exudates)
  - heart (heart failure)
- Get this patient to the ER (and call us)

What will happen if I refer to peds nephrology?

Hypertension referral letter

- Thank you. We have sufficient information to triage your patient

Hypertension referral letter

- As your patient has severe hypertension (> 95th%ile + 30mmHg) OR symptoms of concern (including severe, persistent headaches, changes in level of consciousness, visual disturbances, or symptoms of congestive heart failure) please call the Nephrologist on call at (204) 787-2071 for management recommendations. In most cases there will be a recommendation for this patient to be seen at the local emergency department for assessment .

Hypertension referral letter

- [|To triage your patient appropriately we suggest the following:]
- [|Your patient has elevated blood pressure without symptoms. Please arrange a follow-up manual blood pressure to determine urgency of referral within 1-2 weeks to confirm it is persistently elevated. Please forward this blood pressure when obtained to (204) 787-1075 along with:]
- [|A height and weight]
- [|Serum electrolytes, Ur, Cr, a urinalysis and urine albumin:creatinine ratio and non-fasting cholesterol] [| and: HbA1c, ALT and fasting cholesterol panel] [|and]
- [|A 24-hour ABPM [|and a renal u/s [|select for <age 6, risk, and/ or Indigenous patients from out of Winnipeg and/or clinical judgement (delete)] will be coordinated with the appointment.]

Back to the cases

Case 1

- A 13 year old boy comes to his primary care provider for assessment/management of his medications
- He is on methylphenidate for ADHD; it is working well at the current dose
- His blood pressure is 134/86; his mother worries that by continuing the medication his kidneys, brain and heart will suffer damage from hypertension
- **Should his medication be stopped/changed?**

Treat the patient and we'll treat the BP

- HTN relatively common – 5% in a recent CDN study
- Neither Canadian nor American recommendations recommend stopping or reducing stimulant meds in children with ADHD and hypertension
- High rate of white coat hypertension in these kids – half of those referred

- Take home: leave the meds, refer for an ABPM and treat the hypertension if required

Case 2

- A 16 year old girl presents to her primary care pediatrician for evaluation of amenorrhea
- She lacks secondary sexual characteristics (Tanner stage 1)
- Initial vital signs:
  - BP 170/120
  - HR 95 bpm
  - RR 20
- She is asymptomatic
- **What might tie the amenorrhea and BP together? What tests could be performed at this time?**

Case 2

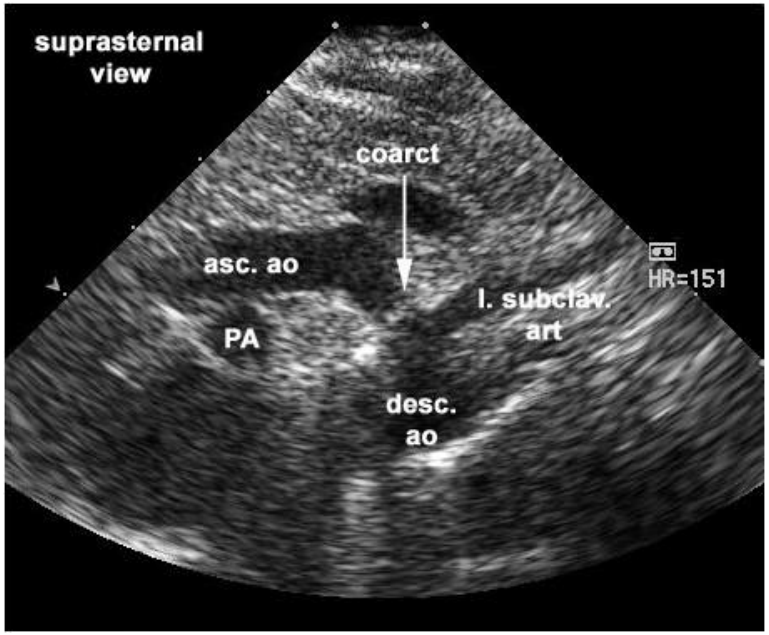
- 17 OHP deficiency, a rare form of congenital adrenal hyperplasia (CAH) resulting from loss-of-function mutations involving the *CYP17* gene
- Patient was XY genotype, female phenotype, identified as a girl, no uterus
- Treated with dexamethasone, BP normalized

- **Take home: some causes of HTN are weird/wonderful- do a careful history and PE to check for them**

Case 3

- A 5 year old boy comes for a primary care visit “checkup” and vaccination
- His blood pressure is 145/110
- He has been previously well, though parents note he does not keep up as well with sports as his older siblings
- **What physical exam findings may be helpful at this point to help make a diagnosis?**

- Exercise intolerance was, on further history taking, claudication (pain when moving)
- Femoral pulses and 4 limb BP
- SE click on cardiac exam (suggestive of bicuspid aortic valve)



Case 4

- A 9 year old girl comes for assessment as part of her primary care “checkup”
- She is obese and has had a BMI > 85th %ile since age 2
- She is 131 cm tall and weighs 58 kg, her BMI is 33.8 kg/m2
- Her BP is 119/76
- Food security is a longstanding issue for her family who rely on EI
- The family often relies on the food bank for assistance, and the increasing costs of staple goods has made this worse
- **How can you help this child?**

Case 4

- Hypertension referral, treatment only a small part of the solution
- Motivational interviewing can be helpful here
- DASH diet etc will only work if the family can afford and access
- ***Poverty supports key to success***

TAKE HOME MESSAGES

- Blood pressure can and should be checked in the community
- Diagnosis is the key to therapy- most causes will not be weird/wonderful but occasionally they will be
- Treatment is a combo of pharmacologic and lifestyle
- MI and poverty supports are tools in the toolbox


University
of Manitoba