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- 2003 lulus Sarjana Kedokteran Fakultas Kedokteran Universitas Gadjah Mada Yogyakarta
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- **PENGALAMAN BEKERJA**
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IKATAN DOKTER ANAK INDONESIA IDAI

RSDM

UPDATE ON CLINICAL PRACTICES :
FROM THE FIRST 1000 DAYS OF LIFE TO ADOLESCENT

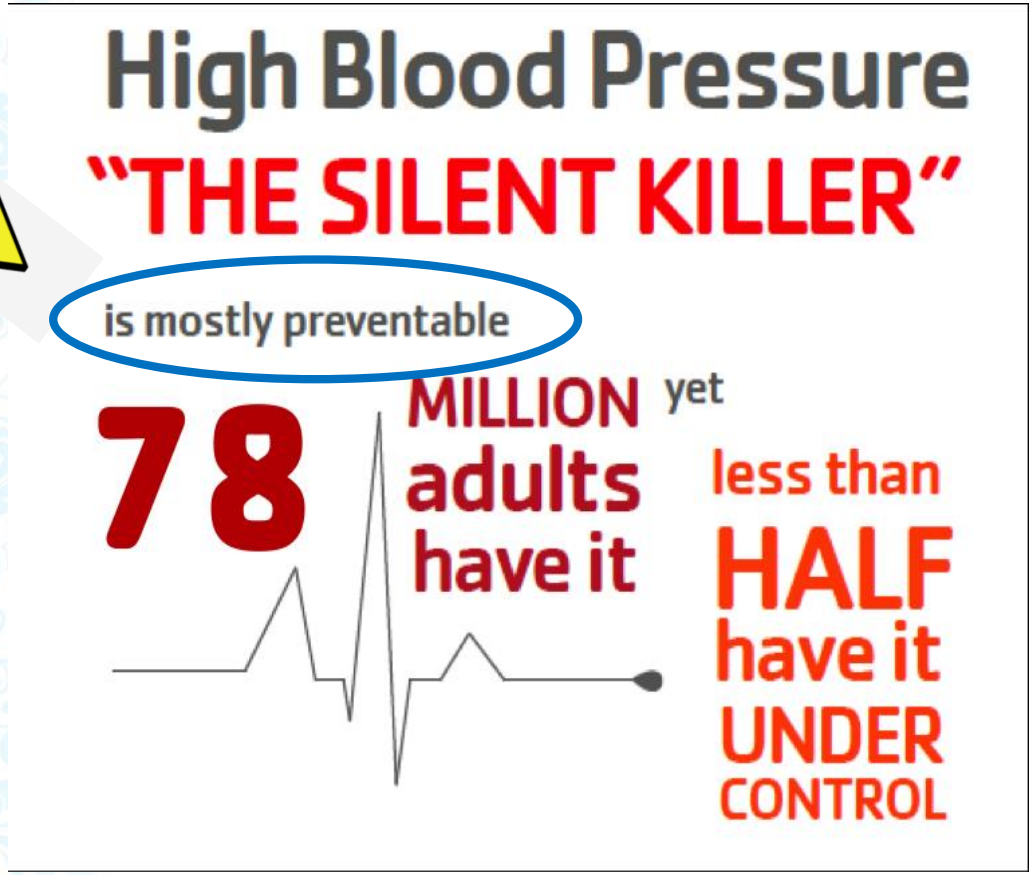
Bagian Ilmu Kesehatan Anak FK UNS/RSUD Dr. Moewardi Surakarta

Have you checked your patient's blood pressure?

Agustina Wulandari

Nephrology division

Pediatric Departement of Moewardi Hospital/ Sebelas Maret University



Childhood Blood pressure (BP) is associated with BP in later life.

Chen X, Wang Y. Trancking of Blood Pressure from childhood to adulthood: A Systematic review and Meta Regression Analysis. Circulation. 2008;117:3171-80

Hypertension. 2013 August ; 62(2): 247–254. doi:10.1161/HYPERTENSIONAHA.111.00831.

Childhood Blood Pressure Trends and Risk Factors for High Blood Pressure: The NHANES experience 1988–2008

Bernard Rosner, PhD,
Channing Division of Network Medicine, Department of Medicine, Harvard Medical School, Boston, MA

The obesity epidemic in children makes it plausible that prevalence rates of elevated blood pressure are increasing over time. Yet, previous literature is inconsistent due to small sample sizes. Also, it is unclear whether adjusting for risk factors can explain longitudinal trends in prevalence of elevated blood pressure. Thus, we analyzed a population-based sample of 3,248 children in National Health and Nutrition Examination Survey (NHANES) III (1988–1994) and 8,388 children in continuous NHANES (1999–2008), ages 8–17. Our main outcome measure was elevated blood pressure (systolic blood pressure (SBP) or diastolic blood pressure (DBP) 90th percentile or SBP/DBP 120/80mmHg). We found that the prevalence of elevated blood pressure (bp) increased from NHANES III to NHANES 99-08 (Boys: 15.8% to 19.2%, p=0.057; Girls: 8.2% to 12.6%, p=0.007). Body mass index (BMI) (Q4 vs Q1, Odds Ratio (OR) =2.00, p<0.001), waist circumference (Q4 vs Q1, OR=2.14, p<0.001) and sodium (Na) intake (3,450mg vs <2,300mg/2,000 calories, OR=1.36, p=0.024) were independently associated with prevalence of elevated blood pressure. Also, mean SBP, but not DBP was associated with increased Na intake in children (quintile 5 (Q5) vs. quintile 1 (Q1) of Na intake, Beta = 1.25 ± 0.58, p=0.034). In conclusion, we demonstrate an association between high Na intake and elevated bp in children. After adjustment for age, gender, race/ethnicity, BMI, waist circumference and sodium intake, OR for elevated bp in NHANES 99-08 vs. NHANES III = 1.27, p=0.069.

Pediatric hypertension causes

1. Primary hypertension

- Characteristics include:
  - ≥6 years of age; positive family history of HTN; obesity/overweight
- Severity of BP elevation is similar between primary and secondary HTN
  - Diastolic HTN predictive of secondary cause
  - Systolic HTN predictive of primary HTN

2. Secondary hypertension

- Retrospective case series of children with secondary HTN show that:
  - Renal parenchymal disease or renal structural abnormalities account for 34%–76%
  - Renovascular disease accounts for 12%–13%
- Renal causes especially likely among children <6 years of age

Blood pressure measurement frequency

BP should be measured annually ≥ 3 year of age, unless risk factors are present : obesity, taking medications, renal disease, history of coarctation aorta, diabetes

Blood pressure measurement devices :

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Jalan H.R. Rasuna Said Blok X5 Kavling 4-9 Jakarta 12950
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GERMAS

Berdasarkan hal tersebut, maka setiap Fasilitas Pelayanan Kesehatan wajib melaksanakan penghapusan alat kesehatan bermerkuri seperti termometer, tensimeter, dental amalgam dalam waktu secepat-cepatnya dan selesai selambat-lambat pada akhir tahun 2020 dengan langkah-

3. Ketua Asosiasi: PERSI, ARVI, ARSADA, ARSSI, ARSPI, ADINKES

SURAT EDARAN

NOMOR: HK.02.02/I/2899/2019

TENTANG

PENGHAPUSAN DAN PENARIKAN ALAT KESEHATAN BERMERKURI

3. Melaksanakan langkah-langkah substitusi penggantian alat kesehatan bermerkuri dengan yang tidak bermerkuri dan menetapkan penanggung jawab pelaksana dengan melibatkan berbagai unsur terkait di Fasilitas Pelayanan Kesehatan masing-masing.

1. Penghapusan merkuri adalah upaya pelarangan produksi merkuri, penggunaan merkuri, dan/atau penggantian merkuri dengan bahan alternatif yang ramah terhadap kesehatan manusia dan lingkungan hidup.
2. Target penghapusan merkuri untuk Fasilitas Pelayanan Kesehatan sebesar 100 persen di tahun 2020.

Oscillometric vs auscultatory blood pressure ?

Blood Pressure Monitoring. 24(2):83–88, APR 2019

Comparability of oscillometric to simultaneous auscultatory blood pressure measurement in children

Jennifer Ringrose;Abdullah Alabbas;Afrooz Jalali;Harsimran Khinda;Catherine Morgan;Verna Yiu;R. Alexander;Raj Padwal;

Results

Mean age was 7.95±2.82 years, 40% were female, mean arm circumference was 21.86±4.06 cm, and 50% had hypertension or a history of hypertension. Mean auscultatory BP for all participants (systolic±SD/diastolic±SD) was 93.40±11.80/50.50±9.04 mmHg, oscillometric fixed-ratio BP was 99.20±11.90/57.35±7.15 mmHg and oscillometric slope-based algorithm was 91.60±13.94/60.65±7.71 mmHg. Compared to auscultation, the fixed-ratio method differed by 5.80±12.72/6.85±7.51 mmHg (*P*=0.06 and <0.01) and the slope-based method differed by −1.80±13.59/10.15±8.07 mmHg (*P*=0.56 and <0.01). Differences from auscultation were statistically significant for diastolic BP with both fixed-ratio and slope-based methods for all age categories but of greatest magnitude in the youngest children.

Conclusion

Oscillometric BP derived using two commonly used algorithms differed by more than 5 mmHg in either systolic BP or diastolic BP from simultaneous auscultatory BP in children aged 2–11. These findings emphasize the need for greater understanding of the functionality and accuracy of oscillometry in children.

Rev Invest Clin. 2014 Jul-Aug;66(4):319-29.

[Pilot study: Wrist digital sphygmomanometers as an alternative for noninvasive blood pressure measurement in pediatric population].

[Article in Spanish]
Navor-Galeana NP, Gutierrez-Martínez J.

Abstract

In current clinical practice, the mercury sphygmomanometer (MS) is being replaced by alternatives as aneroid sphygmomanometer and semiautomatic and automatic-type digital sphygmomanometers (DS). However, a validated DS in adults may not be appropriate for use in the pediatric population, particularly for wrist-type devices. A pilot study was conducted to determine if wrist DS can replace the MS for clinical use in children population. Measuring blood pressure for pediatric patients with wrist diameter greater 13.5 cm was made. The correlation between wrist DS and mercurial device was evaluated and compared by Bland-Altman. The flexible-bracelet wrist DS (CH-656C) showed discrepancies in the mean ± standard deviation differences from 2.6 ± 5.5 to 5.8 ± 6.2 mmHg compared to the mercury device, while the rigid-wrist DS (CH-607) showed variations from 3.9 ± 5.2 to 11.4 ± 7.6 mmHg compared to the MS. For some cases, the agreement was not presented because the results are above the criteria of the American Association for Advancement Medical Instrumentation. This study revealed that the discrepancy of the results is so high for both digital devices, which makes it impossible suggest that any of them can replace the MS. Therefore, it is recommended that hospitals should ensure validation in the pediatric population before the wrist DS is used, particularly when it is utilized for diagnosis in children under 11 years.

KAS 5: Oscillometric vs Auscultatory Blood Pressure

- Oscillometric devices may be used for BP screening in children and adolescents. When doing so, providers should use a device that has been validated in the pediatric age group. If elevated BP is suspected on the basis of oscillometric readings, confirmatory measurements should be obtained by auscultation.

Flynn JT, Kaelber DC, Baker-Smith CM, et al., and AAP Subcommittee on Screening and Management of High Blood Pressure in Children. Clinical practice guideline for screening and management of high blood pressure in children and adolescents. *Pediatrics*. 2017;140(3):e20171904

Differences in Blood Pressure by Body Position (Supine, Fowler's, and Sitting) in Hypertensive Subjects

Giancarlo Cicolini[1], Carmine Pizzi[2], Elisabetta Palma[1], Marco Bucci[1], Francesco Schioppa[1,3], Andrea Mezzetti[1,4] and Lamberto Manzoli[1,3]

BACKGROUND

Although blood pressure (BP) differences from supine to sitting position have long been recognized, limited data are available on other commonly used body positions. We performed a cross-sectional study to compare BP values obtained in supine, sitting, and Fowler's positions in essential hypertensive subjects.

METHODS

Systolic BP (SBP) and diastolic BP (DBP) were recorded using an automatic oscillometric device. Nine measurements were taken: three measurements, in random order, in supine, Fowler's, and sitting position. Two generalized estimating equations models were used to evaluate potential predictors of SBP and DBP adjusting for heart rate and measurement order.

RESULTS

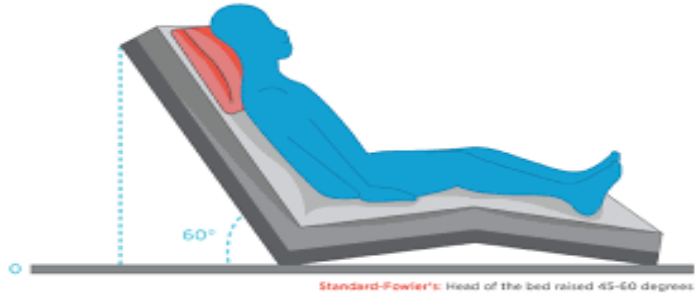
The sample consisted of 250 subjects (mean age 66.3 ± 13.4 years; 44.4% males). Measured in supine, Fowler's, and sitting position, mean SBPs were 139.3 ± 14.0; 138.1 ± 13.8; 137.2 ± 13.7 mm Hg, respectively, and mean DBPs 80.1 ± 9.1; 81.9 ± 9.4; 83.0 ± 9.6 mm Hg, respectively. At multivariate analysis, mean SBP significantly decreased if measured in Fowler's and sitting positions, as compared to supine. In contrast, DBP significantly increased. A relevant proportion of subjects showed large differences (≤ or ≥10 mm Hg) in mean SBP across positions: i.e., 30.0% comparing supine vs. sitting SBP. An even higher prevalence of large differences was observed according to the measurement order within the same positions, with no univocal direction (random variation).

CONCLUSIONS

Fowler's position may represent a valid alternative to sitting and supine positions for BP measurement in clinical practice. BP random variability was found to be large regardless of body position, reinforcing the need for operators to closely follow current guidelines that recommend ≥2 recordings at each measurement.

Keywords: *blood pressure; blood pressure measurement; blood pressure variability; Fowler's position; hypertension*

American Journal of Hypertension, advance online publication 16 June 2011;



Simplified BP table for screening

TABLE 6 Screening BP Values Requiring Further Evaluation

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

New blood pressure tables

TABLE 4 BP Levels for Boys by Age and Height Percentile

Age (y)	BP Percentile	SBP (mm Hg)						
		Height Percentile or Measured Height						
		5%	10%	25%	50%	75%	90%	95%
1	Height (in)	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
	50th	85	85	86	86	87	88	88
	90th	98	99	99	100	100	101	101
	95th	102	102	103	103	104	105	105
	95th + 12 mm Hg	114	114	115	115	116	117	117
	90th	100	100	101	102	103	103	104	55	55	56	56	57	58	58
	95th	104	104	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
	90th	101	102	102	103	104	105	105	58	58	59	59	60	61	61
	95th	106	106	107	107	108	109	109	60	61	61	62	63	64	64
	95th + 12 mm Hg	118	118	119	119	120	121	121	72	73	73	74	75	76	76

Flynn JT, Kaelber DC, Baker-Smith CM, et al., and AAP Subcommittee on Screening and Management of High Blood Pressure in Children. Clinical practice guideline for screening and management of high blood pressure in children and adolescents. *Pediatrics.* 2017;140(3):e20171904

Blood pressure categories

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 mm Hg, 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 = blood pressure; HTN = hypertension.

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Patient Evaluation

- Once HTN diagnosis has been confirmed, patient should be evaluated to:
  - Determine underlying cause
  - Assess for comorbidities
- Evaluation should include:
  - Patient and family history
  - Physical examination
  - Laboratory and imaging studies

Screening tests

TABLE 10 Screening Tests and Relevant Populations

Patient Population	Screening Tests
All patients	Urinalysis
	Chemistry panel, including electrolytes, blood urea nitrogen, and creatinine
	Lipid profile (fasting or nonfasting to include high-density lipoproteina and total cholesterol)
	Renal ultrasonography in those <6 y of age or those with abnormal urinalysis or renal function
In the obese (BMI >95th percentile) child or adolescent, in addition to the above	Hemoglobin A1c (accepted screen for diabetes)
	Aspartate transaminase and alanine transaminase (screen for fatty liver)
	Fasting lipid panel (screen for dyslipidemia)
Optional tests to be obtained on the basis of history, physical examination, and initial studies	Fasting serum glucose for those at high risk for diabetes mellitus
	Thyroid-stimulating hormone
	Drug screen
	Sleep study (if loud snoring, daytime sleepiness, or reported history of apnea)
	Complete blood count, especially in those with growth delay or abnormal renal function

Flynn JT, Kaelber DC, Baker-Smith CM, et al., and AAP Subcommittee on Screening and Management of High Blood Pressure in Children. Clinical practice guideline for screening and management of high blood pressure in children and adolescents. *Pediatrics*. 2017;140(3):e20171904

Treatments

Lifestyle interventions

1. Moderate to vigorous physical activity at least 3 -5 days per week (30 – 60 min per session)
2. DASH diet (*Dietary Approach to Stop Hypertension*)

Pharmacologic Treatment

- Prescribe antihypertensive medications if:
  - Patient has failed at least 6 months of lifestyle change
  - Symptomatic HTN
  - Stage 2 HTN without clearly modifiable risk factor (e.g. obesity)
- 1st line agents may include:
  - Angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB)
  - Long-acting calcium channel blocker
  - Thiazide diuretic
- In CKD or diabetes:
  - ACE inhibitor or ARB

Overall Treatment Goals

- Achieve a BP level that
  - Reduces risk for target organ damage
  - Reduces risk for hypertension-related cardiovascular disease in adulthood
- Achieve an optimal BP level:
  - <90th percentile / <130/80 mm Hg in adolescents

Patient evaluation & management according to BP level

TABLE 11 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]	Diagnostic Evaluation[b]	Initiate Treatment[c]	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]	Initial measurement	X	X	—	—	—	—
	Second measurement: repeat, refer to specialty care within 1 wk	X	—	X	X	X	X

X, recommended intervention; —, not applicable.

Treatment Follow-Up and Monitoring

- Patients treated with antihypertensive medications should be seen every 4–6 weeks for dose adjustments until goal BP is reached, then every 3–4 months.
- Patients treated with lifestyle change only should be seen every 3–6 months to assess success of BP reduction and to reassess need for pharmacologic treatment.

today
is a
good
day
to
start