

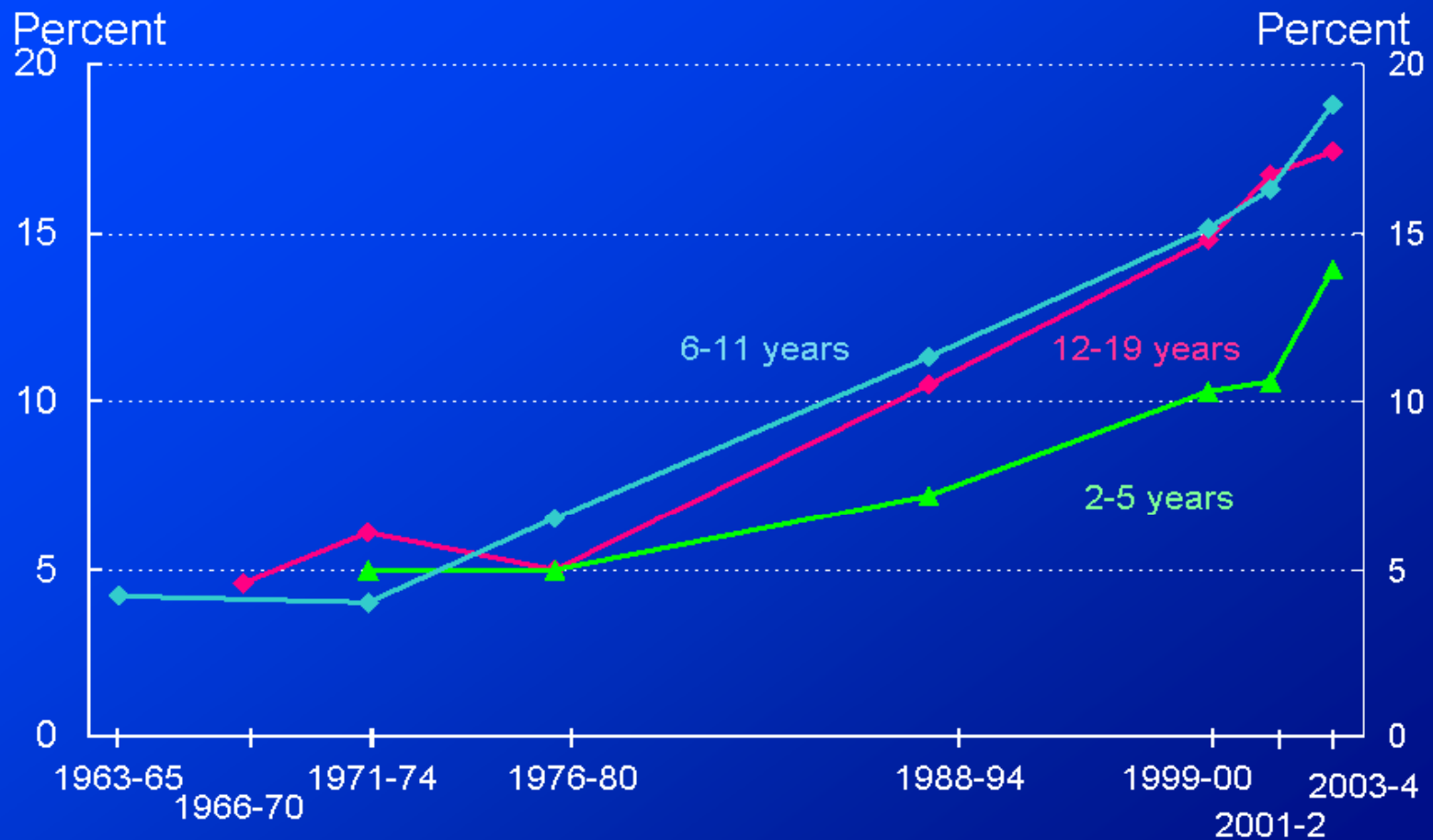
ROLE OF CLINICAL GUIDELINES AND FEDERAL INITIATIVES IN AVERTING AN EPIDEMIC

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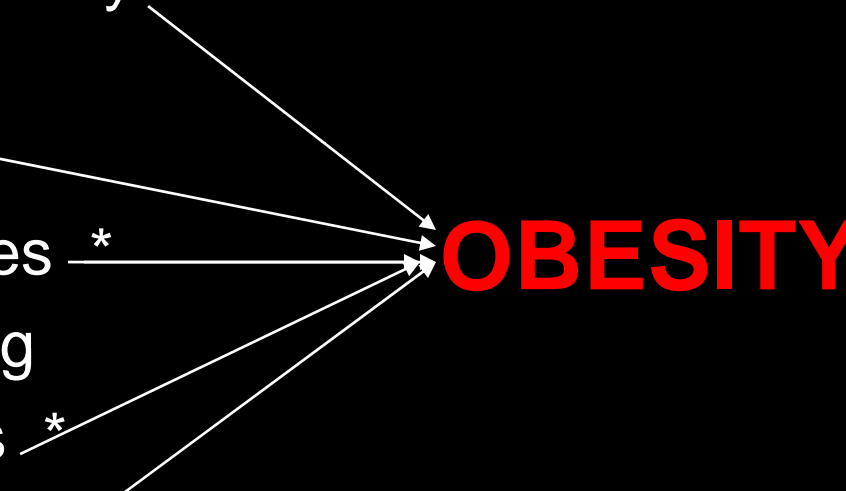
National Heart
Lung and Blood Institute

Trends in Child and Adolescent Overweight



Note: Overweight is defined as BMI \geq gender- and weight-specific 95th percentile from the 2000 CDC Growth Charts.
Source: National Health Examination Surveys II (ages 6-11) and III (ages 12-17), National Health and Nutrition Examination Surveys I, II, III and 1999-2004, NCHS, CDC.

OBESITY-RELATED RISK FACTORS

- Positive family history*
 - Male sex
 - Hypertension *
 - Lipid abnormalities *
 - Cigarette smoking
 - Diabetes mellitus *
 - Physical inactivity *
- 
- The diagram illustrates the relationship between various risk factors and obesity. On the left, a list of seven risk factors is presented, each preceded by a red bullet point. On the right, the word "OBESITY" is written in large, bold, red capital letters. White arrows originate from the right side of each risk factor and point directly towards the "OBESITY" text, indicating that each of these factors is associated with or contributes to the condition of obesity.
- OBESITY**

PEDIATRIC HYPERTENSION

Primary / Essential hypertension

- Strong familial basis
- Very often associated with obesity
- Common, especially after 10 yrs of age
- Degree of HBP usually mild - moderate

Secondary

- Specific etiology, varying with age of presentation
- Uncommon – prevalence $< 0.1\%$
- Degree of HBP often severe
- Early presentation, often < 10 yrs of age

PREVALENCE OF HYPERTENSION IN OBESE CHILDREN

Reinehr et al

Nutrition, Metabolism and Cardiovascular Dis 2005;15:181-7

- 1004 children, 4 German obesity centers, 1999-2002
- BMI > 90th%ile(Overweight) 15%
- BMI > 97th%ile(Obese) 40%
- BMI > 99.5%ile(Extremely obese) 45%
- Overall, 37% of the children had hypertension
- Prevalence of HBP by degree of obesity:
 - Overweight: 21%
 - Obese: 33%
 - Extremely obese: 46%

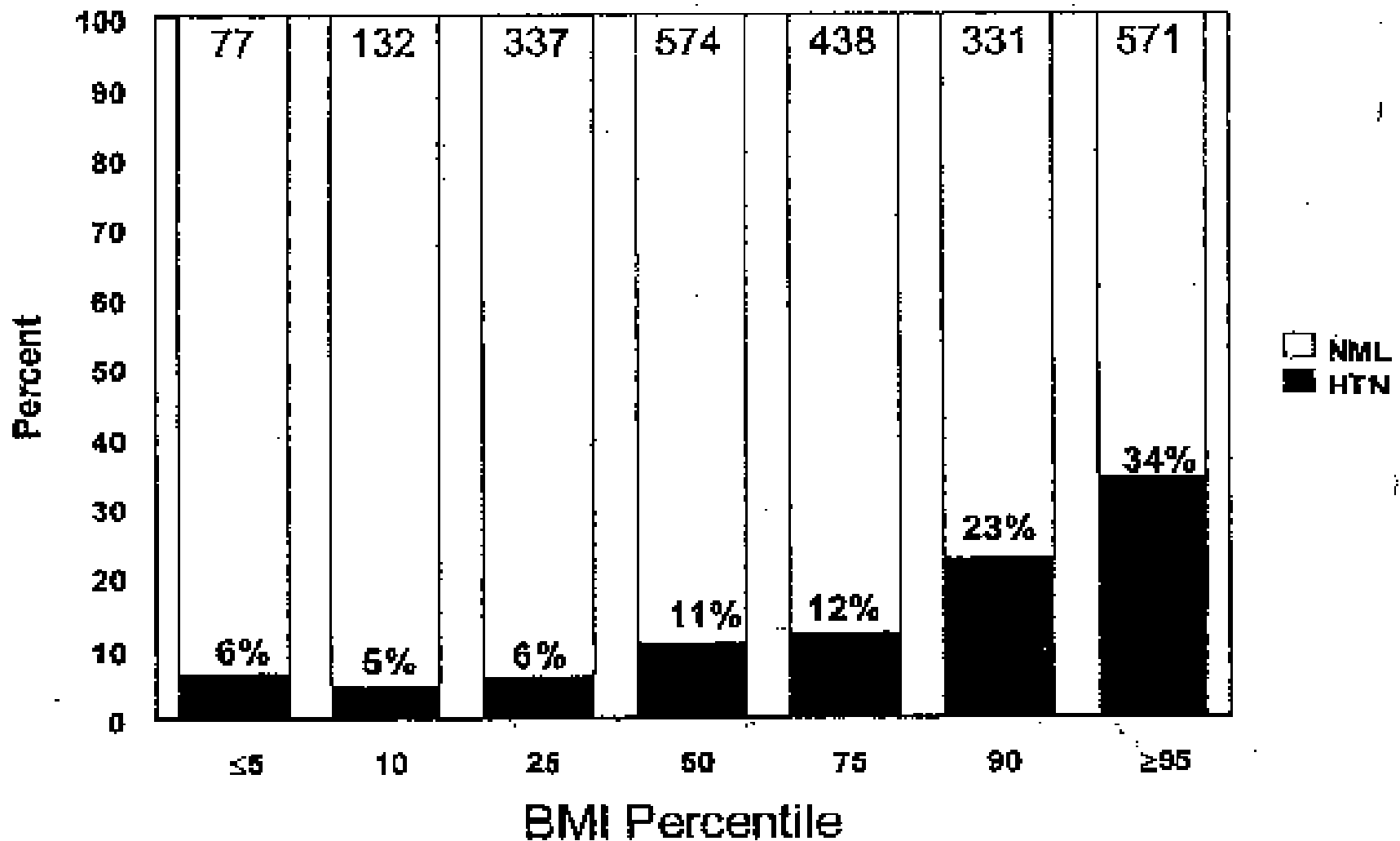
Overweight, Ethnicity and Prevalence of Hypertension in School-Aged Children

Sorof J et al

Pediatrics 2004;113:475-82

- School-based screening of 5,102 children
 - Overweight = BMI > 95thile
 - Hypertension = SBP \pm DBP > 95thile
 - If first BP > 95thile, repeated X 2
- **RESULTS:** After 3 screenings, overall prevalence of hypertension was 4.5%

HYPERTENSION PREVALENCE BY BMI %ILE



Sorof J et al

Pediatrics 2004;113:475-82

POPULATION DATA

TRENDS IN BLOOD PRESSURE AMONG CHILDREN AND ADOLESCENTS

Muntner P et al

JAMA 2004;291:2107-2113

- Compare systolic and diastolic BPs in NHANES from 1988-1994 and 1999-2000

RESULTS:

- SBP was 1.4 mmHg higher (CI: 0.6,2.2) and DBP 3.3 mmHg higher (CI: 2.1, 4.5) in 1999-2000 vs 1988-1994 (both, $p < .001$).
- After adjustment for BMI, increase in SBP was reduced by 29% and in DBP by 12%.

Has BP Increased in Children in Response to the Obesity Epidemic?

Chiolero A et al.

Pediatrics 2007;119:545-552

- SR of studies from 1980-2006
 - (1) Population-based studies → prevalence of HBP;
(2) HBP trends from cohort studies and paired longitudinal surveys in defined populations
 - Inclusion criteria: Prevalence reported; BP technique provided; US reference tables used
 - HBP = > 95th percentile for age/ sex/ ht
- 8 prevalence studies reported from 1986-2004

HBP Prevalence

<i>Sample</i>	<i>Year</i>	<i>N</i>	<i>Tech/ #</i>	<i>Systolic HBP%</i>
Minnesota	'86-87	19,542	Hg 2/2	M / F 2.7/0.8
Pakistan	'90-'94	5,641	Hg 2/2	M / F 8.7/6.2
Quebec	1999	3,589	Aut 3/2	M+F/age 7/13/17
Houston	'00-'01	2,460	Aut 3/3	M+F/ser 16/11/8
Milan	'03-'04	2,416	Hg 3/3	M+F/ser 8.8/4.2
Delaware	2002	18,618	An 1/1	M+F 7.2
Houston	2002	5,102	Aut 3/3	M+F/ser 19.4/9.5/4.5
Seychelles	'02-'04	15,612	Aut 2/2	M / F 6.1/6.0

BP TRENDS OVER TIME

- One cohort study/ 5 cross sectional surveys
- Years of evaluation: Initial 1973-1995
F/U 1989-2004
- N: 52-1018; all stratified by sex, cohort by race
- Differing BP techniques by study & period
- Range of SBP change over time: + 1.4 to - 11.6
- Range of DBP change over time: + 3.3 to - 11.9
- Largest decreases seen with later yrs of follow-up

High Blood Pressure Trends in Children and Adolescents in National Surveys, 1963 to 2003

Din-Dzietham R et al

Circulation 2007;116:1488-1496

- Combined NHES (1963-1970) & NHANES (1971-2002) data
- 8-17 y, non-Hispanic white, black and Mexican-American (M-A)
- BP measurement methods varied over time and between surveys
- BPs classified into gender-, age- & height-specific BP %iles

RESULTS

- HTN prevalence decreased on each survey until 1988-96 and increased thereafter
- Between 1988 and 2002, pre-HTN increased by 2.3%($p=0.0003$) and HTN by 1%($p=0.17$)
- In 1999-2002, HTN prevalence was 4.2% for blacks, 3.3% for whites, 4.6% for M-A
- Increasing BMI and waist circumference both significantly increased the likelihood of HTN

COMPLICATING FACTORS: DEFINING NORMAL

TECHNICAL ISSUES:

Normal values

Cuff size/ Arm size

BP instrumentation

Measurement protocols

BP Levels That Define High BP in a 13 y Old Boy from 1966 to 2004

Falkner B

Circulation 2007;116:1437-1439

	1966: Londe	1977: 1 st TF Report	1987: 2 nd TF Report	1996: 3 rd TF Report	2004: 4 th TF Report
95th%ile	144/80	140/90	128/82	126/82	126/81

US demographic trends in mid-arm circumference and recommended blood pressure cuffs for children and adolescents: data from the NHANES 1988-2004

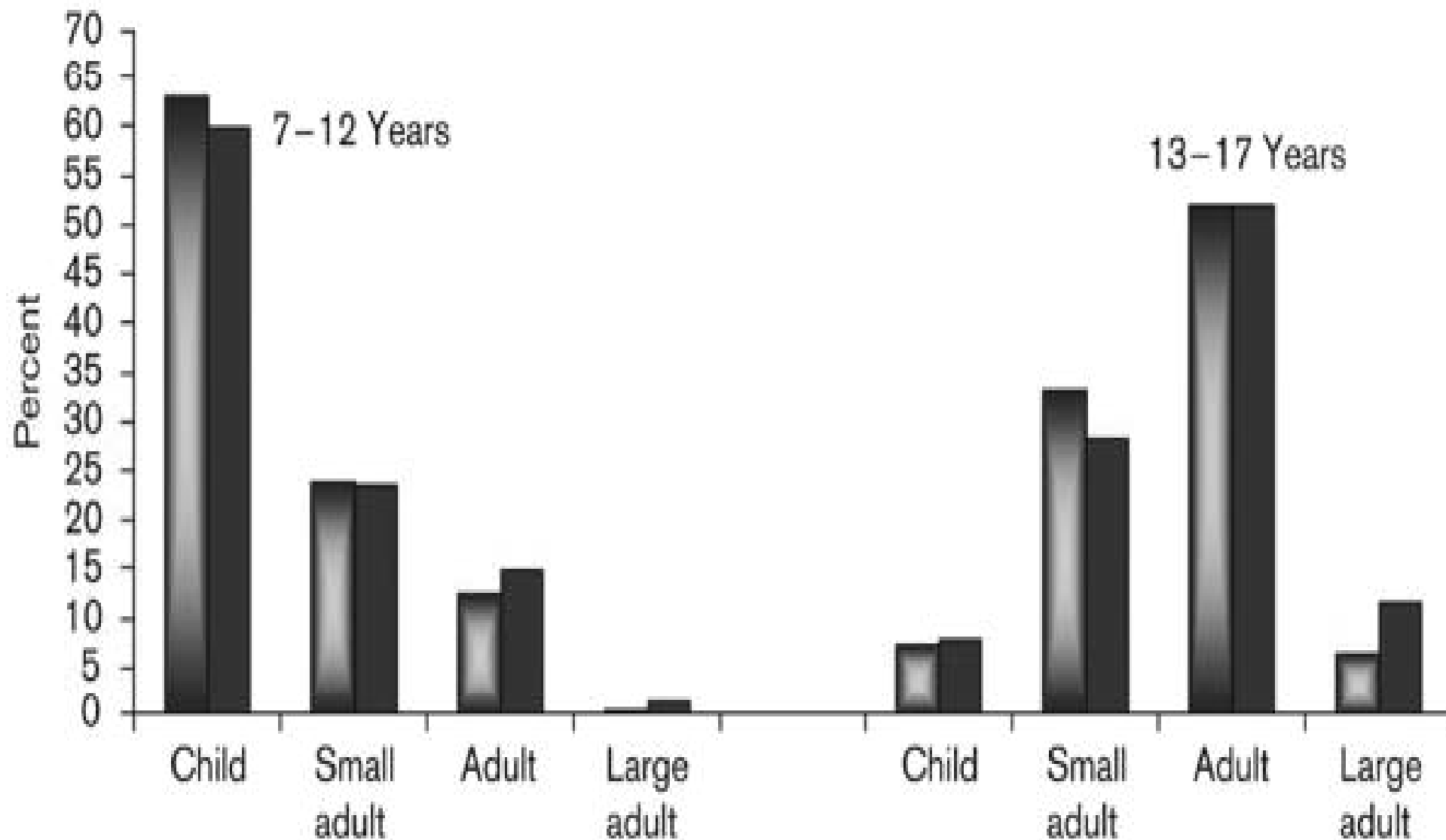
Prineas RJ et al

Blood Press Monit 2007;12:75-80

NHANES	1988-1994		1999-2004	
BOYS	Arm Circ	SE	Arm Circ	SE
7-12 y	22.2	0.2	22.8	0.1
13-17 y	28.5	0.3	29.0	0.1
GIRLS				
7-12 y	22.3	0.2	23.0	0.1
13-17 y	27.0	0.2	27.6	0.2

CUFF SIZE BY AGE GROUP BETWEEN NHANES SURVEYS

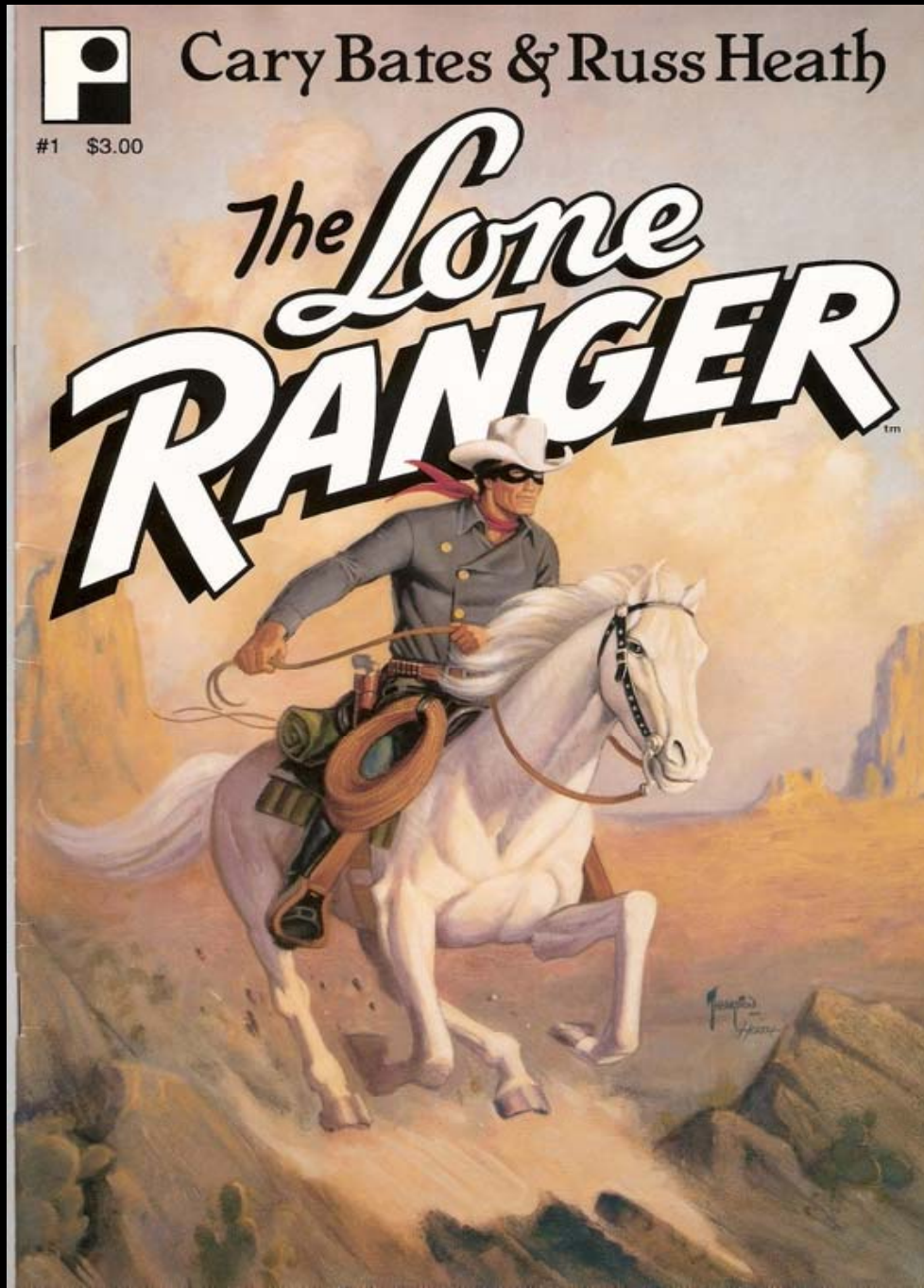
□ NHANES 1988-1994 ■ NHANES 1999-2004



CONCLUSIONS: IMPACT OF OBESITY EPIDEMIC ON BP IN CHILDHOOD

- Minimal but significant increase in BP and HTN prevalence over time in cross sectional surveys
 - Rare longitudinal studies report a decline or at most a minimal increase in BP over the last 20 yrs
 - In obese children, HTN prevalence is significantly increased
 - Methodologic and practice issues complicate true assessment of HTN prevalence in children
- Overall, population data suggest increasing BP levels and HTN paralleling rise in obesity but to this time, no HTN epidemic.

**GUIDELINES
TO THE
RESCUE ?**



❖ DEFINITION

Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances (Institute of Medicine, 1990). The statements contain recommendations that are based on evidence from a rigorous systematic review and synthesis of the published medical literature.

CURRENT PEDIATRIC CV GUIDELINES

- NHLBI: NCEP, 4th Pediatric BP TF Report (2004)*; Expert Panel Integrated Guidelines for CV Health & Risk Reduction(2009) *
- HHS: Dietary Guidelines for Americans (2005); Physical Activity Guidelines (2008)
- AAP: Lipids (2008); Activity
- AHA:
 - Primary prevention in childhood (2003)
 - High risk pediatric patients (2006)
 - Drug treatment of severe childhood hyperlipidemias (2007)
 - Dietary CV health recommendations for children/ adolescents (2005)
 - Metabolic syndrome in childhood (2008)
- AMA/ CDC/ HRSA: Pediatric Overweight and Obesity (2007) *
- ADA: Diabetes screening (2002)

**❖ The Fourth Report on the
Diagnosis, Evaluation and Treatment
of High Blood Pressure in Children
and Adolescents**

Pediatrics 2004;114(Suppl 2):555-576

❖ NHLBI PEDIATRIC BP TASK FORCE REPORTS: NORMAL BP TABLES

- 1st TF Report - 1977 → Normal BP for age
- 2nd TF Report - 1987: Data from >70,000 children
→ Revised standards: Normal BP for age/ sex
- 3rd TF Report - 1996 → Normal BP for age/ sex/ ht
- 4th TF Report - 2004 : 1999-2000 NHANES data added → ~85,000 children; Normal BP for age/ sex/ height %ile
- Ethnic distribution: White 54%; Black 29%; Hispanic 10%; Asian 3%; Native American 1%; other 3%.

Guidelines for BP Measurement, Classification and Management

Measurement: Correct cuff size/ technique, annually from age 3

- ✓ Cuff size = Largest cuff possible
- ✓ Child seated and “relaxed”
- ✓ Auscultatory technique with bell

Interpretation/Management: BP tables for age/ sex/ ht %ile →

- Normal: $< 90^{\text{th}}$ %ile → Recheck at next evaluation
- Pre-HTN: $\geq 90^{\text{th}}$ %ile – 95^{th} %ile, Repeat X 2/ average; if confirmed, follow q.6 m
- Stage 1 HTN: $\geq 95^{\text{th}}$ – 99^{th} %ile + 5mmHg → Repeat X 2/ average; if confirmed, repeat on 2 occasions → BP W/U
- Stage 2 HTN: BP $\geq 99^{\text{th}}$ %ile + 5 mmHg, Repeat X 2/ average; if confirmed, begin diagnostic W/U/ start treatment

HYPERTENSION WORK-UP

Evaluation for identifiable causes:

- ✓ H & P/ BMI + leg BP
- ✓ BUN/ Cr/ Electrolytes/ U/A/ urine culture/ CBC
- ✓ Renal U/S

Evaluation for comorbidity:

- ✓ Fasting glucose/ lipid panel
- ✓ Possible drug screen
- ✓ Possible polysomnography

Evaluation for target organ damage:

- ✓ Echocardiogram for LV mass
- ✓ Retinal exam

**** If limited W/U for etiology (-) and child is obese, proceed with weight management program.**

INDICATIONS AND MEDICATIONS FOR TREATMENT

- Symptomatic HTN
- Secondary HTN
- Hypertensive organ damage
- Associated diabetes, type 1 and type 2
- Persistent HTN despite lifestyle measures

Table of drug trial results with dose ranges and contraindications provided.

**Expert Committee
Recommendations for the
Prevention, Assessment, &
Management of Child and
Adolescent Overweight & Obesity**

**Sponsored by the
CDC, HRSA & the AMA**

Pediatrics 2007;120(Suppl 4):S164-S288

PURPOSE and PROCESS

- Practical guidance in all areas of obesity care
- Supportive literature review
- Evidence unavailable → expert consensus
- Recommendations graded:
 - Recommend with consistent evidence (CE)
 - Recommend with mixed evidence (ME)
 - Suggest
- 3 writing groups: Assessment
Prevention
Treatment

ASSESSMENT/ DEFINITION

BMI-Based

	<i>Former</i>	<i>Recommended</i>
$< 5^{\text{th}}$ %ile	Underweight	Underweight
5^{th} - 84^{th} %ile	Healthy weight	Healthy weight
85^{th} – 94^{th} %ile	At risk of overweight	→ Overweight
$\geq 95^{\text{th}}$ %ile	Overweight	→ Obese

PREVENTION

UNIVERSAL ANNUAL ASSESSMENT:

- BMI
- DIETARY INTAKE
- SCREEN TIME
- PHYSICAL ACTIVITY
- EATING BEHAVIOR
- FAMILY HX OF OBESITY, T2DM, CVD

TREATMENT

- Stage 1: PREVENTION PLUS
 - Stage 2: STRUCTURED WEIGHT MANAGEMENT
 - Stage 3: COMPREHENSIVE MULTIDISCIPLINARY INTERVENTION
 - Stage 4: TERTIARY CARE REFERRAL
- * All interventions based on assessment of patient and family's willingness to change.

**❖ NHLBI EXPERT PANEL
INTEGRATED PEDIATRIC
GUIDELINES ON
CARDIOVASCULAR HEALTH
AND RISK REDUCTION**

NHLBI GUIDELINES: NEW APPROACH

- I. Expert Panel leadership
- II. Formal evidence review
- III. Integrated – multiple RFs addressed simultaneously in a single guideline
- IV. “Continuously” updated
- V. Outcome evaluation



CLASSIC SYSTEMATIC EVIDENCE REVIEW

- Independent process
- RCT review addressing a single question
- Rigorous process includes only a small # of studies
- Defined format for abstraction of studies, presentation of results and evidence grading
- Review process itself results in recommendations
- If evidence judged inadequate, “no recommendation” is an acceptable conclusion

Eg. USPS TF, Cochrane reviews

PEDIATRIC GUIDELINE FACTS

- Multiple risk factors, birth to 21 y
 - Clinical CVD endpoint remote
 - Goal = Prevention of risk factors + prevention of future disease: *Primordial and primary prevention*
 - Known gaps in the evidence base but recommendations needed for patient care guidance
- ***MODIFIED EVIDENCE REVIEW PROCESS:***
- Evidence for evaluation/ intervention requires inclusion of epidemiologic/ observational studies
 - Evidence gaps mandate explicit inclusion of the Expert Panel throughout

RISK FACTORS ADDRESSED

- Family history
- Diet/ Nutrition
- Activity
- High blood pressure
- Lipids
- Obesity
- Smoking
- Diabetes mellitus
- Inflammation
- Metabolic syndrome
- Other disease processes

ANALYSIS OF THE PROBLEM/ EVIDENCE REVIEW PROCESS

DEFINING CRITICAL QUESTIONS:

- Phase 1: Development of atherosclerosis relative to presence and intensity of RFs:
9 questions
- Phase 2: RF reduction/ Impact on atherosclerotic process:
5 questions

EVIDENCE REVIEW/ GUIDELINE DEVELOPMENT PROCESS

- I. Problem Analysis → Define critical questions
- II. Electronic search strategy
- III. Review of titles/abstracts → Full text review
- IV. Develop evidence tables
- V. Review and grade the evidence
- VI. Develop graded age-specific recommendations – integrated across multiple RFs
- VII. Full panel review/ approval → Final draft guideline
- VIII. Rigorous independent review with 30 day public comment period, formal approval by HHS

GUIDELINE FORMAT

I. State of the Science – CV RFs & atherosclerosis in childhood

II. Screening – Potential risks and benefits

III. Primordial prevention:

- Diet/ Nutrition
- Activity/ sedentary behavior
- Tobacco exposure

All children

IV. Primary prevention:

- High blood pressure
- Dyslipidemia
- Obesity
- Diabetes/ other high risk conditions

Selected children:
Identification &
Treatment

V. Cardiovascular Health Schedule

HIGH BLOOD PRESSURE

- Based on the 2004 NHLBI 4th TF report
- Evidence review updated for 2003-08
- Diagnosis of high BP as in the 4th TF report with BP measurement annually from age 3
- BP interpretation/ classification using age/sex/ht %ile, 4th Report normative tables
- Algorithms for evaluation of secondary HTN and management of elevated BP
- Complete updated tables of drug trials for managing HTN in childhood with dosage range and side effects

OBESITY

- Evidence review identified > 100 RCTs, SRs, M-As
- **Background:** Pathologic/ imaging/ epidemiologic evidence relating obesity to atherosclerosis, obesity tracking, childhood obesity impact on adult CVD
- **Prevention:** From the evidence review, the age-specific diet and activity recommendations for all children were determined to be adequate to prevent development of obesity → Algorithms provided
- **Treatment:** Age-specific staged recommendations for treatment of established obesity, including use of medication provided
- Discussion re: surgical treatment



INTEGRATED CARDIOVASCULAR HEALTH SCHEDULE

	BIRTH–12m	1- 4 y	5 - 9y	9 - 11 y	12 - 17 y	18 – 21 y
FAMILY HX		AT 3 Y, EVALUATE FAMILY HX FOR EARLY CVD: Parents,GPs,aunts/uncles,M ≤ 55y,F ≤ 65y. Review with parents, refer prn		Family hx for early CVD in GPs,parents, aunts, uncles, ≤ 55y in M, ≤ 65 y in F.		Repeat family hx evaluation with patient.
SMOKING	ADVISE SMOKE FREE HOME; offer smoking cessation assistance to parents	Active anti-smoking counseling with parents. Offer smoking cessation assistance	Active anti-smoking counseling with child	Assess smoking status of child. Active anti-smoking counseling	Active anti-smoking counseling with patient. Offer smoking cessation assistance	Strong anti-smoking message Offer smoking cessation assistance
DIET/ NUTRITION	Support breast feeding as optimal to 12 m if possible. Add formula if breast feeding decreases before 12 m of age.	From 12-24 m, change to cow's milk with % fat per pediatric care provider. After 2y, fat free milk for all; juice ≤ 4 oz/ day; Transition to CHILD-1 diet by 2y of age.	Reinforce CHILD-1 diet messages.	Reinforce CHILD-1 diet messages as needed.	Quick 24 hr diet recall from child → reinforce healthy diet, limitations	Review healthy diet with patient.
GROWTH	Review family hx for obesity → discuss wt for ht tracking, growth chart, healthy diet.	CHART HT/ WT/ BMI → CLASSIFY WT BY BMI, FROM AGE 2, review with parent	Chart ht/ wt/ BMI & review with parent. BMI >85 th %ile crossing %iles intensify diet/ activity focus X 6m. If no change --> RD referral, manage per obesity algorithms BMI>95 th ile, → obesity algorithms	Chart ht/ wt/ BMI → Review with parent & child BMI >85 th %ile, crossing %iles, intensify diet/ activity focus X 6m. If no change - -> RD referral, manage per obesity algorithms. BMI>95 th ile, manage per obesity algorithms	Chart ht/ wt / BMI → Review with child and parent. BMI > 85 th %ile crossing %iles intensify diet/ activity focus X 6m. If no change - -> RD referral, manage per obesity algorithms. BMI>95 th ile, manage per obesity algorithms	Review ht/ wt/ BMI and norms for health with patient. BMI > 85 th %ile, crossing %iles intensify diet/ activity focus X 6m. If no change -> RD referral, manage per obesity algorithms. BMI>95 th ile, manage per obesity algorithms

GUIDELINES IMPLEMENTATION ???

SCREENING AND COUNSELING ASSOCIATED WITH OBESITY DIAGNOSIS IN A NATIONAL SURVEY OF AMBULATORY PEDIATRIC VISITS

Cook S et al

Pediatrics 2005;116:112-116.

- **Objective:** To examine clinician-reported frequency of obesity dx and BP measurement
- 32,000 well child visits for 2- to 18 y olds, 1997-2000

RESULTS:

- Obesity diagnosed at 0.93% of well child visits
- BP measured at 61.1% of WCVs with diagnosis of obesity vs. 43.9% of visits without obesity
- Diagnosis of hypertension not reported

THE FREQUENCY OF BLOOD PRESSURE MEASUREMENT IN CHILDREN IN FOUR EDs

Silverman MA et al

Am J Emerg Med 2000; 18:784-788

- Retrospective chart review of triage BP measurement from 4 pediatric EDs (n=437)

RESULTS:

- 294/437 pts (67%) had BP recorded
- 52% had BP > 90th %ile for age/sex
- Only 38% of these pts with elevated 1st BP had 2nd BP performed
- No diagnosis of hypertension made

SUMMARY: CLINICAL GUIDELINES, EPIDEMIC OBESITY & HYPERTENSION

- Obesity epidemic: +++++; HTN epidemic: +
 - HTN prevalence significantly increased with obesity
 - Methodological issues complicate BP measurement
 - Recognition of HTN & consequences sub-optimal
 - Presence of overweight/ obesity mandates a defined approach to wt status + BP assessment
 - 4th Task Force/ NHLBI Integrated Guidelines
= Evidence-based age-specific diagnosis &
treatment recommendations
- * Guidelines useless if not adopted

FEDERAL INITIATIVES

- ***We Can!***[™] - "Ways to Enhance Children's Activity & Nutrition"
- NHLBI program for families & communities to help children maintain a healthy weight.
- Focus: Food choices, physical activity, screen time
- Provides resources to help prevent childhood overweight.
- Corporate partnerships with Subway, RWJ, etc
- > 1,130 communities have joined ***We Can!***

FEDERAL INITIATIVES

Research: NHLBI RFA-HL-10-004

Childhood Obesity Prevention and Treatment Research Consortium

Application Receipt Date: October 6, 2009

Cooperative agreement grant applications to
conduct RCTs testing innovative interventions to
address prevention/ treatment of childhood obesity

7 yr project award period

Up to 4 Research Center awards.

**GUIDELINES
TO THE
RESCUE??**

