

Diagnòstic i tractament HTA

Reunió Grup de Treball Societat Catalana de Cardiologia Pediàtrica.
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Hospital Joan XXIII



Índex

Diagnòstic:
Definicions i
realitat

MAPA/ABPM

Tractament

En que m'he basat

- (1) Lurbe E, Agabiti-Rosei E, Cruickshank JK, Dominiczak A, Erdine S, Hirth A, et al. 2016 European Society of Hypertension guidelines for the management of high blood pressure in children and adolescents. *J Hypertens*. 2016;34(10):1887–920.
- (2) Flynn JT, Falkner BE. New clinical practice guideline for the management of high blood pressure in children and adolescents. *Hypertension*. 2017;70(4):683–6. American Academy of Pediatrics
- (3) Krist AH, Davidson KW, Mangione CM, Barry MJ, Cabana M, Caughey AB, et al. Screening for High Blood Pressure in Children and Adolescents: US Preventive Services Task Force Recommendation Statement. *JAMA - J Am Med Assoc*. 2020 Nov 10;324(18):1878–83. US Preventive Services Task Force
- (4) Rabi DM, McBrien KA, Sapir-Pichhadze R, Nakhla M, Ahmed SB, Dumanski SM, et al. Hypertension Canada's 2020 Comprehensive Guidelines for the Prevention, Diagnosis, Risk Assessment, and Treatment of Hypertension in Adults and Children. *Can J Cardiol*. 2020 May 1;36(5):596–624.
- (5) Mancia G, Kreutz R, Brunström M, Burnier M, Grassi G, Januszewicz A, et al. 2023 ESH Guidelines for the management of arterial hypertension the Task Force for the management of arterial hypertension of the European Society of Hypertension: Endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA). *J Hypertens*. 2023 Dec 1;41(12):1874–2071. (*però no per la European Society of Cardiology*)
- (6) Lurbe E, Mancia G, Calpe J, Drożdż D, Erdine S, Fernandez-Aranda F, et al. Joint statement for assessing and managing high blood pressure in children and adolescents: Chapter 1. How to correctly measure blood pressure in children and adolescents. *Front Pediatr*. 2023 Apr 11;11. HyperChildNET and the European Academy of Pediatrics based on 2016 European Guidelines

Screening HTA en població pediàtrica

US Preventive Services Task Force 2013: the 'current evidence is insufficient' to assess the balance of benefits and harms of screening for primary hypertension in asymptomatic children and adolescents to prevent subsequent CV disease in childhood or adulthood

US Preventive Services Task Force 2020 : This recommendation applies to children and adolescents not known to have hypertension. The current evidence is insufficient to assess the balance of benefits and harms of screening for high blood pressure in children and adolescents (igual que en adults però ho recomana en >18a i fer annual en >40a)

AAP 2017: BP should be measured annually in children and adolescents ≥ 3 y of age or at 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 (Quality of evidence C. Strength or Recommendation moderate).

European Society of Hypertension 2016 : lack of evidence does not necessarily justify inaction. Therefore, the consensus of the present guidelines is that BP should be measured in children starting from the age of 3 years. Once BP is measured, children considered that normotensive should be reevaluated every 2 years, whereas those with high-normal BP and no organ damage should be seen again after 1 year.

European Society of Hypertension 2023 : BP should be screened in children starting from the age of 3 years (Quality of evidence C, Strength of Recommendation I) (en adults també) (or <3y in high-risk conditions)

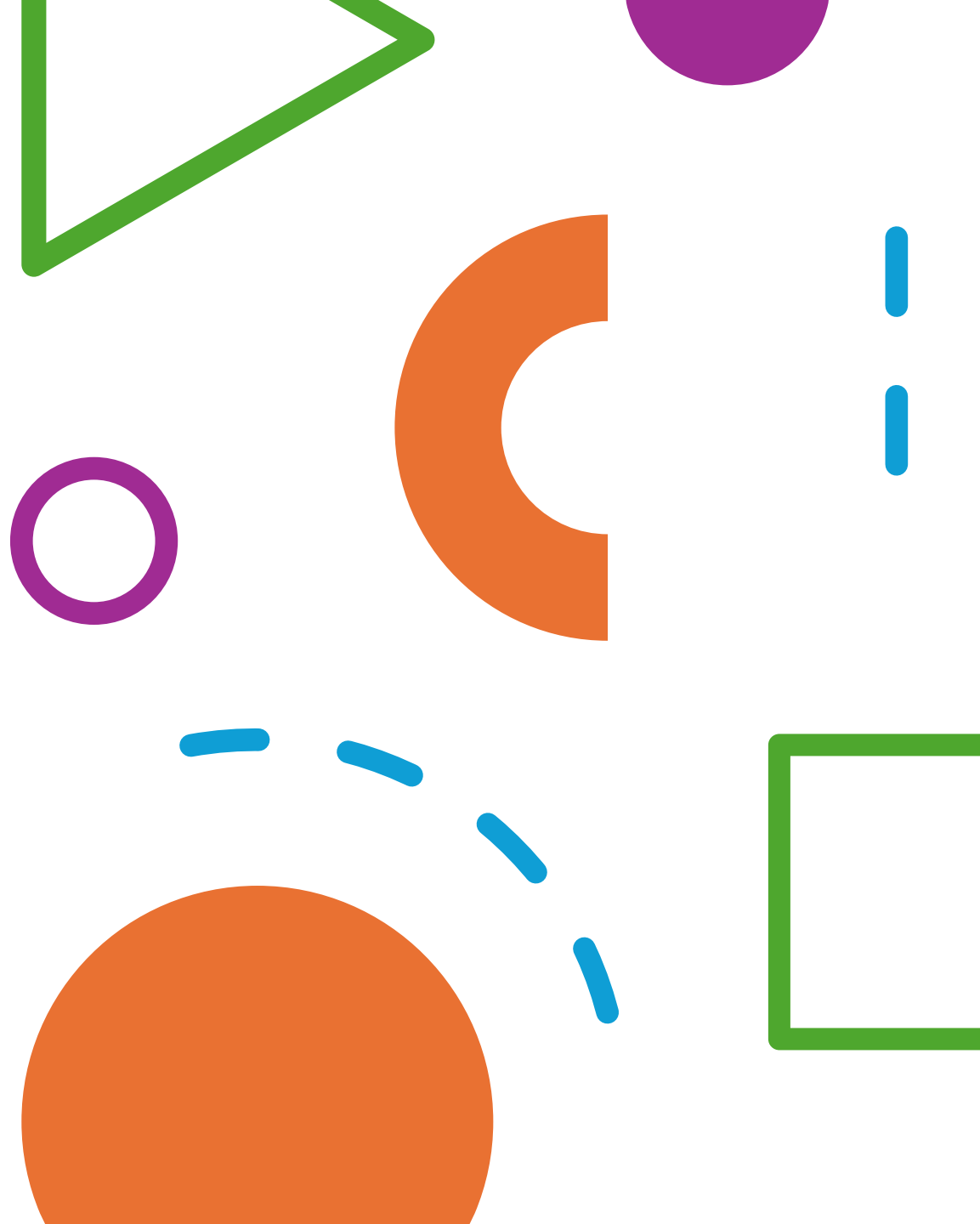
Canada 2020 : BP should be measured regularly in children 3 years of age or older; the auscultatory method is the gold-standard at present (oscillometric devices may be used for BP screening)

Diagnòstic HTA en població pediàtrica

On la mirem?

Amb que la mirem?

Com la valorem?



On la mirem i quina ens creiem

A la consulta:

*Office blood pressure measurement (OBPM)

*Unattended OBPM

A casa: Home blood pressure measurement
(HBPM)

Monitorització 24h o MAPA: Ambulatory blood
pressure monitoring (ABPM)

Com i amb que la mesurem?

- **Mètode** auscultatori → Gold Standard segons totes les guies pediàtriques (a Canadà per adults recomanen oscil·lomètric)
- **Dispositius** validats
 - Mètode auscultatori:
 - Mercuri: Retirats del mercat!
 - Aneroide: Precisa calibració periòdica
 - Mètodes oscil·lomètric: pocs dispositius validats per pediatria
- Però els dispositius oscil·lo mètrics (inclús els validats) solen donar valors significativament més elevats de TAS que mètode auscultatori

Validated blood pressure monitors



Home

 [Download](#)



Office/Hospital

 [Download](#)



Ambulatory

 [Download](#)



Children

 [Download](#)



Pregnancy

 [Download](#)


Devices for Office / Clinic blood pressure measurement





Children


[Download](#)

Validated upper-arm devices available on the market (11)


 **A&D** UM-212BLE


 **Microlife** WatchBP Office


 **Microlife** WatchBP Office (BP3SK1-3B) *


 **Microlife** WatchBP Office ABI


 **Microlife** WatchBP Office AFIB *


 **Midmark** IQvitals Zone

 **Omron** HBP-1120 (HBP-1120-E) *

 **Omron** HBP-1320


 **Raycome** RBP-1200

 **Welch Allyn** ProBP 2000

 **YuWell** YE900

Devices for Ambulatory blood pressure monitoring

Validated upper-arm devices available on the market (3)

 **Custo Med** custo screen pediatric

Tiba Medical Ambulo 2400

A l'hospital Joan XXIII

- A CEX nefro/cardio pediàtrica:
- A Planta hospitalització
- A CEX nefro MAPA (pediàtric i adult)



Devices for Office / Clinic blood pressure measurement

Validated upper-arm devices available on the market (11)

- | | |
|---|--|
| 🏆 A&D UM-212BLE | 🏆 Omron HBP-1120 (HBP-1120-E) * |
| 🏆 Microlife WatchBP Office | 🏆 Omron HBP-1320 |
| 🏆 Microlife WatchBP Office (BP3SK1-3B) * | 🏆 Raycome RBP-1200 |
| 🏆 Microlife WatchBP Office ABI | 🏆 Welch Allyn ProBP 2000 |
| 🏆 Microlife WatchBP Office AFIB * | 🏆 YuWell YE900 |
| 🏆 Midmark IQvitals Zone | |



C



Avoid: smoking, caffeine, food or exercise 30 min before



Quiet room



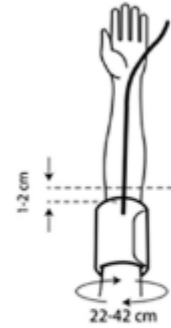
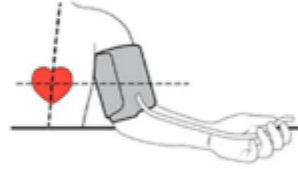
Comfortable temperature



Rest for 3-5 minutes before



No talking to patient during measurements



Appropriate cuff
At heart level

Arm stretched on table

Take 3 measurements
Use mean of last 2

Feet flat on floor

Back straight and supported

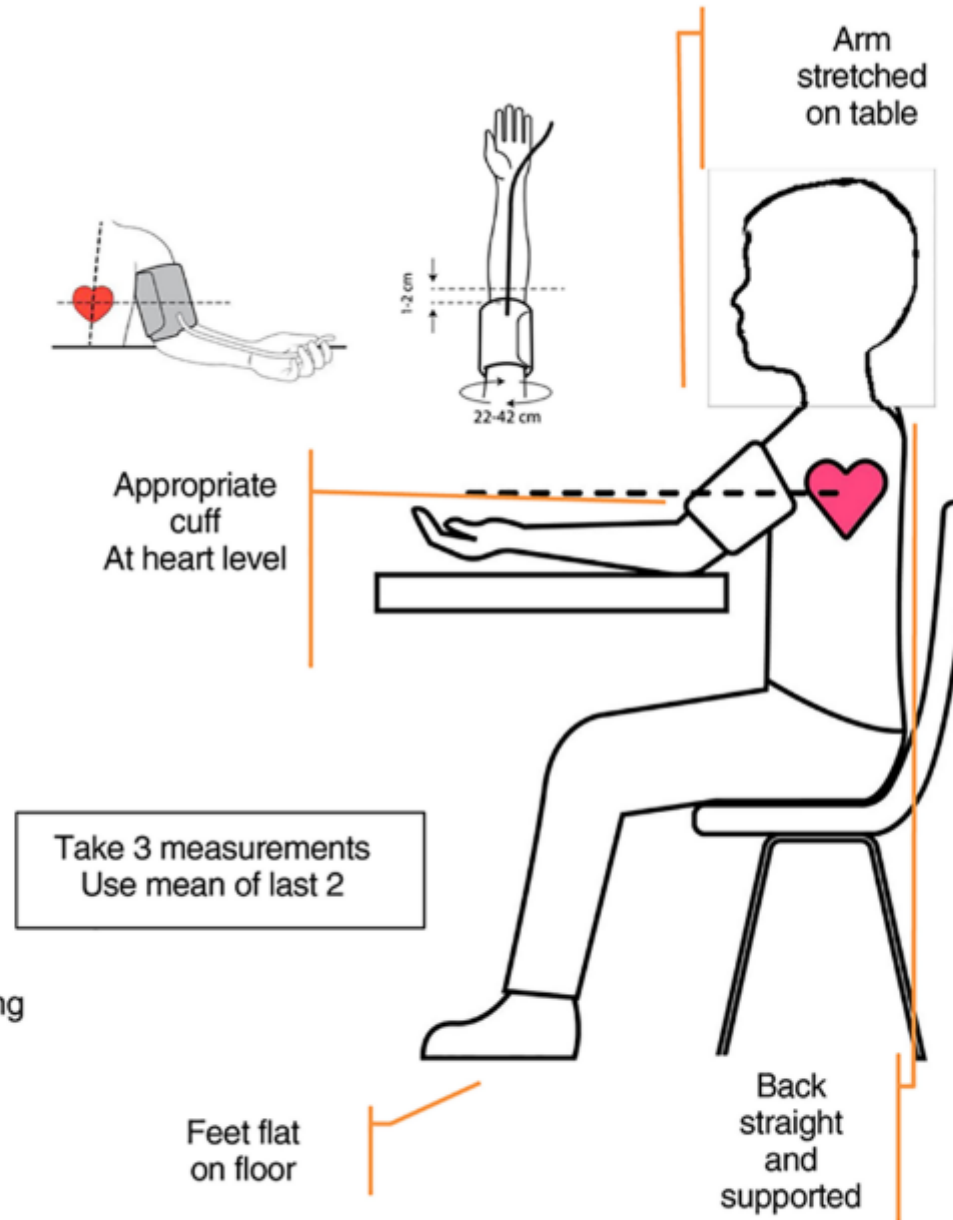


TABLE 3 Common mistakes during office blood pressure measurement.

Methodology	Equipment
<ul style="list-style-type: none">• Single measurement• Noisy, cold room• Talking or crying• Neither arm or back support• Hanging/Crossing legs• Measurement over clothes• Diagnosis of high BP by measuring BP on legs or calves, instead of on the right arm	<ul style="list-style-type: none">• Small and large cuffs• Non-validated devices• Non-calibrated devices• Cuff and device from different manufacturers• Wrist or forearm devices

Lurbe E, Mancia G, Calpe J, Drożdż D, Erdine S, Fernandez-Aranda F, Hadjipanayis A, Hoyer PF, Jankauskiene A, Jiménez-Murcia S, Litwin M, Mazur A, Pall D, Seeman T, Sinha MD, Simonetti G, Stabouli S, Wühl E. Joint statement for assessing and managing high blood pressure in children and adolescents: Chapter 1. How to correctly measure blood pressure in children and adolescents. *Front Pediatr.* 2023 Apr 11;11:1140357. doi: 10.3389/fped.2023.1140357. PMID: 37138561; PMCID: PMC10150446.

Y tu qué tomas
para estar
mejor?

Yo tomo
distancia.



Ja tenim un valor, i ara que?

Guia americana
(Flynn 2017)

Guia canadenc
(Rabi 2020)

Guia europea
(Lurbe 2016,
Lurbe 2023,
Mancia 2023)

Classificació dels valors de TA en nens i adolescents **USA** (OBP)

	1-13 anys USA 2017 ²	≥ 13 anys USA 2017 ²
TA normal	TAS i TAD <p90	<120/80 mmHg
TA elevada	TAS o TAD entre p90 i p94	120-129 /<80
HTA Estadi 1	TAS o TAD entre p95 i p95+12mmHg	130-139/80-89
HTA Estadi 2	TAS o TAD \geq p95 + 12 , o \geq 140/90 (el que sigui menor)	\geq 140/90

>p95

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

Recomanen mètode oscil·lomètric

TABLE 5 BP Levels for Girls 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)	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	84.9	86.1	75.4	76.6	78.6	80.8	83	84.9	86.1
	50th	84	85	86	86	87	88	88	41	42	42	43	44	45	46
	90th	98	99	99	100	101	102	102	54	55	56	56	57	58	58
	95th	101	102	102	103	104	105	105	59	59	60	60	61	62	62
	95th + 12 mm Hg	113	114	114	115	116	117	117	71	71	72	72	73	74	74
2	Height (in)	33.4	34	34.9	35.9	36.9	37.8	38.4	33.4	34	34.9	35.9	36.9	37.8	38.4
	Height (cm)	84.9	86.3	88.6	91.1	93.7	96	97.4	84.9	86.3	88.6	91.1	93.7	96	97.4
	50th	87	87	88	89	90	91	91	45	46	47	48	49	50	51
	90th	101	101	102	103	104	105	106	58	58	59	60	61	62	62
	95th	104	105	106	106	107	108	109	62	63	63	64	65	66	66
	95th + 12 mm Hg	116	117	118	118	119	120	121	74	75	75	76	77	78	78
3	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	92.4	94.9	97.6	100.5	103.1	104.6	91	92.4	94.9	97.6	100.5	103.1	104.6
	50th	88	89	89	90	91	92	93	48	48	49	50	51	53	53
	90th	102	103	104	104	105	106	107	60	61	61	62	63	64	65
	95th	106	106	107	108	109	110	110	64	65	65	66	67	68	69
	95th + 12 mm Hg	118	118	119	120	121	122	122	76	77	77	78	79	80	81
4	Height (in)	38.3	38.9	39.9	41.1	42.4	43.5	44.2	38.3	38.9	39.9	41.1	42.4	43.5	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
	50th	89	90	91	92	93	94	94	50	51	51	53	54	55	55
	90th	103	104	105	106	107	108	108	62	63	64	65	66	67	67
	95th	107	108	109	109	110	111	112	66	67	68	69	70	70	71

Classificació dels valors de TA en nens i adolescents (OBPM) **Europa**

	0-15 anys (Europa 2023 ⁶)	>/= 16 anys (Europa 2023 ⁵)
TA òptima		TAS < 120 i TAD < 80 mmHg
TA normal	< p90	TAS 120-129 i TAD 80-84
High-normal	> p90 i < p95	TAS 130-139 i/o TAD 85-89
HTA Grau 1	≥ p95 i < p99+5mmHg	TAS 140-159 i/o TAD 90-99 *
HTA Grau 2	> p95 > p99+5mmHg	TAS 160-179 i/o TAD 100-109
HTA grau 3		TAS ≥ 180 i/o TAD 110

- Valors d'HTA en mínim 3 ocasions separades
- Cal confirmar valors amb mètode auscultatori
- Basat en les taules e la US Task Force
- ABPM recomanada pel diagnòstic (mean BP ≥ p95)
- La mesura ha de ser amb un aparell validat
- Si hi ha diferència entre els braços >10mmHg buscar causa però fer servir el més alt

* HTA en ABPM si TASm > 130 o TADm > 80

Les guies
canadenques han
proposat
simplificar...



Classificació dels valors de TA en nens/adolescents **Canadà⁴** (OBP)

	0-17 anys *	6-11 anys ^{&}	12-17 anys ^{&}
TA normal	<p95		
HTA estadi 1	≥p95 però <p95+12 mmHg		
HTA estadi 2	≥ p95 +12 mmHg	>120/80	>130/85

*Recomanen mètode auscultatori (si oscilomètric, cal confirmar amb auscultatori) braç dret.

Sempre descartar HTA bata blanca amb ABPM

Fan servir les gràfiques US (CDC creixement i valors de TA: US National Health and Nutrition Examination Survey, 1999-2000:

[&]Simplified diagnostic thresholds can be used (in addition to or as an alternative to normative tables) to diagnose hypertension in children and adolescents.

	≥ 18 a [†] AOBP/OBPM	≥ 18 a ABPM
TA normal		
High-normal	130-139/85-89	
HTA	<u>AOBP ≥135/85</u> OBPM ≥140/90 (Per diabetics ≥130/80) ¹⁹	mean 24h ≥130/80 Mean awake ≥135/85

[†]Recomanen mètode oscilomètric

ABPM o MAPA


- Dispositiu validat per pediatria
- Mínim 20 lectures vàlides període despert i 7 període dormit
- S'ha vist que més variabilitat de TA durant el dia → pitjor pronòstic en adults
- Indicada per confirmar HTA

TABLE 7 Interpretation of 24-h ambulatory blood pressure monitoring.

Definition of HTN		
Age	Time Category	ABPM Thresholds
<16 years	24-h average	≥95th percentile ^a
	Daytime (awake) average	≥95th percentile ^a
	Night-time (sleep) average	≥95th percentile ^a
≥16 years	24-h average	≥130/80 mmHg
	Daytime (awake) average	≥135/85 mmHg
	Night-time (sleep) average	≥120/70 mmHg
Circadian variability <16 years and ≥16 years		
Dipper ^b	≥10%	
Non-dipper ^b	<10%	

Devices for Ambulatory blood pressure monitoring

Validated upper-arm devices available on the market (3)

 Custo Med custo screen pediatric

Tiba Medical Ambulo 2400

^a Valors de referència: Wühl 2002 (població caucàsica, taules per talla i edat però només >5 a i > 120cm)

Per sort tenim
eines que ens
poden ajudar

<https://hyperchildnet.eu/blood-pressure-calculator/>



Estudi de pacient un cop hem diagnosticat HTA: Els bàsics

Història

- Antecedents familiars
 - HTA en edats precoces-- > Formes monogèniques
 - (sobretot si K^+ baix → Sd. Liddle)
- Antecedents personals
 - Perinatals (prematuritat, catèters umbilicals,..)
 - Fàrmacs
 - Patologies prèvies
- Clínica associada
 - Sudoració/palpitations/estancament ponderal/debilitat muscular/poliúria/augment de pes,...

Exploració física

- Estigmes cutanis (neurofibromatosis-Feocromocitoma)
- Polsos/Bufs

Estudi de pacient un cop hem diagnosticat HTA

- **Causa?**
- Afectació òrgans diana?
- Comorbiditats associades que condicionaran pronòstic?



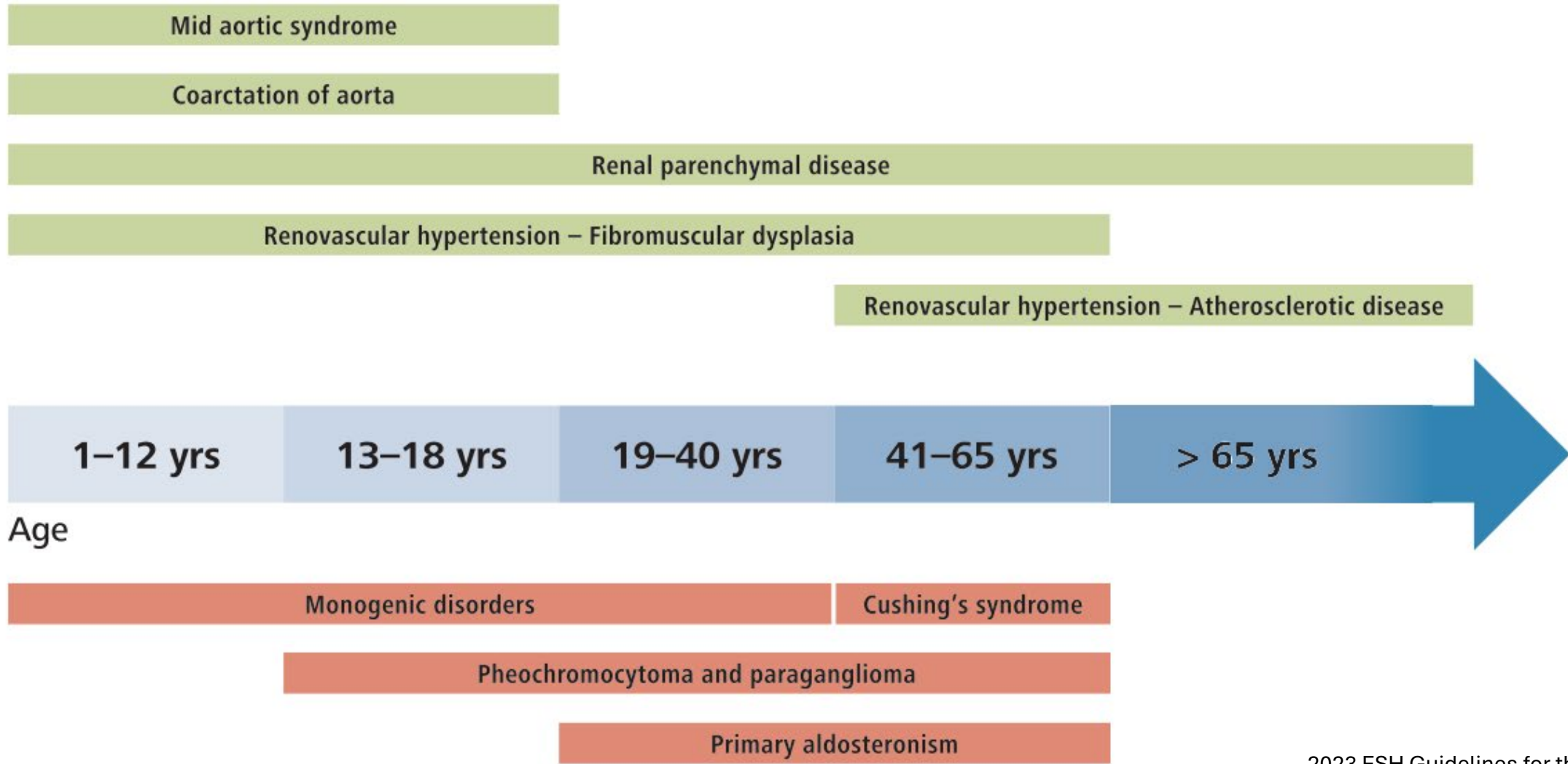
Buscar causa

- Tots els pacients amb TA elevada:
 - Hemograma, ions incloent Ca, P, urea, creat, gasometria, perfil tiroïdal
- En tots els menors de 10 anys o HTA estadi 2
 - Renina/aldosterona
 - Eco doppler renal
 - Catecolamines en orina
 - Cortisol



Afectació òrgans diana

Comorbilitats associades que condicionaran pronòstic



Age

Condition	Phenotype	Mechanism and Treatment
Liddle syndrome	Hypokalemia, metabolic alkalosis, low PRA or PRC, low PAC	Increased renal tubular ENaC activity; responds to treatment with amiloride
Apparent mineralocorticoid excess	Hypokalemia, metabolic alkalosis, low PRA or PRC, low PAC	Decreased 11 β -hydroxysteroid dehydrogenase isoenzyme 2; responds to spironolactone
Gordon syndrome	Hyperkalemia, metabolic acidosis, low PRA or PRC, low/normal PAC	Overactivity of the sodium-chloride cotransporter; responds to thiazides
Geller syndrome	Pregnancy-exacerbated hypertension, low PRA or PRC, low PAC	Agonist effect of progesterone on the mineralocorticoid receptor (which is constitutively active); responds to amiloride, spironolactone activates instead of blocking the receptor
Glucocorticoid-remediable aldosteronism (familial hyperaldosteronism type 1)	Hypokalemia, metabolic alkalosis, low PRA or PRC, increased PAC	Chimeric <i>CYP11B1/CYP11B2</i> gene; responds to glucocorticoids
Familial hyperaldosteronism type 2	Hypokalemia, metabolic alkalosis, low PRA or PRC, increased PAC	Increased activity of CLCN2 chloride channel; responds to steroidal MRA
Familial hyperaldosteronism type 3	Hypokalemia, metabolic alkalosis, low PRA or PRC, increased PAC	Loss of selectivity of KCNJ5 potassium channel; patients who do not respond to steroidal MRA require bilateral adrenalectomy
Familial hyperaldosteronism type 4	Hypokalemia, metabolic alkalosis, low PRA or PRC, increased PAC	Increased activity of CACNA1H calcium channel; responds to steroidal MRA
PASNA syndrome (primary aldosteronism, seizures and neurological abnormalities)	Hypokalemia, metabolic alkalosis, low PRA or PRC, increased PAC; neurological defects coexists	Increased activity of CACNA1D calcium channel; responds to steroidal MRA and CCB
11beta-hydroxylase deficiency	Hypokalemia, metabolic alkalosis, low PRA or PRC, low PAC, virilization of female individuals	Reduced activity of 11 β -hydroxylase with increase of DOC and androgens; responds to glucocorticoids
17alpha-hydroxylase deficiency	Hypokalemia, metabolic alkalosis, low PRA or PRC, low PAC, pseudohermaphroditism in male individuals	Reduced activity of 17 α -hydroxylase with increase of DOC and reduction of androgens; responds to glucocorticoids
Autosomal dominant hypertension with brachydactyly [342]	Brachydactyly type E (BDE), short stature, severe hypertension (salt-independent, age-dependent), high risk of death from stroke before age 50	PDE3A mutations upregulated the cAMP-hydrolytic activity that results in lower cAMP levels in vascular smooth muscle cells

Estudi de pacient un cop hem diagnosticat HTA

- Causa?
- **Afectació òrgans diana?**
- Comorbiditats associades que condicionaran pronòstic?



Afectació òrgan diana

- **Cardiològica:**

- Ecocardio: Valoració hipertrofia ventricle

- esquerra

- Gruix íntima

- Velocitat pols carotid/femoral

- Renal

- Oftalmoscopia

TABLE 4 Definitions of left ventricular hypertrophy (LVH) by age and sex.

Age	Boys	Girls
≤9 years (2)	LVMI ≥95th percentile	LVMI ≥95th percentile
>9 to 15 years (2, 3)	LVMI >45 g/m ^{2.7}	LVMI >40 g/m ^{2.7}
≥16 years (3)	LVMI >50 g/m ^{2.7}	LVMI >47 g/m ^{2.7}
≥16 years (4)	LVMI >115 g/m ²	LVMI >95 g/m ²

LVMI, left ventricular mass index; Percentile calculation according to Khoury et al. (2).

	Grade
Left ventricular hypertrophy (LVH) should be assessed by echocardiography (ECHO).	B
Electrocardiography is not recommended as a tool for assessment of LVH.	C
Measurement of carotid intima-media thickness (cIMT) and carotid-femoral pulse velocity (PWV) are not obligatory as a first diagnostic step approach to the hypertensive child.	B
cIMT or PWV should be interpreted in relation to appropriate referential values (6–8).	C

Afectació òrgan diana

- Cardiològica
- **Renal**
 - Filtrat glomerular
 - Albuminúria
- Oftalmoscopia

Alb/creat en orina 1^a hora:

N <30mg/g en > 2 anys

<50mg/g en < 2 anys

Càlcul Filtrat glomerular estimat:

Talla (cm)x0,413/Creat (N>90)

Ophthalmoscopy for hypertensive retinopathy is not obligatory at a first diagnostic step. However, in case of severe hypertension/ hypertensive urgency/emergency it may be a useful tool in further therapeutic decisions.	C
Albumin/creatinine ratio in urine should be checked as well as proteinuria and glomerular filtration rate to diagnose kidney damage.	D



Tractament

Quan
tractar?

Com i amb
que tractar?

Tractament

Si tenim causa → tractar la causa

Si no tenim causa →

- Quan tractar? Sempre... Però no amb fàrmacs necessàriament
 - Dieta DASH
 - Restricció ingesta sal
 - Promoure activitat física
 - Limitar pantalles (max 2h dia)
 - Higiene de la son: Dormir poc és un factor de risc per hipertensió
 - Factors ambientals: contaminació!

Involucrar seriosament a la família.

Dieta DASH (Dietary approaches to Stop Hypertension)

- Baixa en sal
- Alta en fruita, vegetals, cereals integrals, làctics baixos en grasses i proteïnes magres.
- Emfatitza aliments rics en Ca, K, Mg i fibra

The Benefits: Lowers blood pressure & LDL "bad" cholesterol.

 **Eat This**

 **Limit This**

 Vegetables	 Fatty meats
 Fruits	
 Whole grains	 Full-fat dairy
 Fat-free or low-fat dairy	
 Fish	 Sugar sweetened beverages
 Poultry	
 Beans	 Sweets
 Nuts & seeds	
 Vegetable oils	 Sodium intake

Quan tractar amb fàrmacs

Sempre associat a l'anterior

- Quan hi ha afectació d'òrgans diana
- Quan és simptomàtica
- Quan està associada a diabetis
- HTA secundària
- En els casos de HTA primària que després de 6-12 mesos no han millorat amb mesures higiènic-dietètiques

Recomanació
grau C

Recomanació
grau D

Tractament farmacològic

- Manca de bons RCT
- Presentacions pediàtriques...poques
- Conèixer/valorar efectes adversos/contraindicacions
- Experiència personal amb el fàrmac

Fàrmacs comercialitzats a Espanya en suspensió

- Propranolol (Hemangirol/Propranolol 3,75mg/ml) però indicació Hemangiomes. Preu sense recepta 225 euros per 120ml
- Valsartan 3mg/ml (Diovan).
- Nifedipino (Nife-Par 5mg/ml) però us hospitalari per prevenir part prematur

Tractament farmacològic

Present condition	First-line antihypertensive(s)
Chronic kidney disease	ACE-inhibitor or angiotensin-receptor blocker
Diabetes mellitus	ACE-inhibitor or angiotensin-receptor blocker
Coarctation of aorta	Calcium-channel blocker
Obesity-related hypertension	ACE-inhibitor or angiotensin-receptor blocker/ Calcium-channel blocker
Posttransplant hypertension	Calcium-channel blocker
Primary hyperaldosteronism	Potassium-sparing diuretic
Congestive heart failure	β -blocker/ACE-inhibitor or angiotensin-receptor blocker
Microalbuminuria	ACE-inhibitor or angiotensin-receptor blocker
Migraine	Calcium-channel blocker or β -blocker
Corticosteroid induced hypertension	Thiazide or thiazide-like diuretics



Sd Liddle: Diurètics estaviadors de K
Sd Gordon: Diurètics tiazidics

Fàrmacs orals	Dosis
<p>Captopril 25 y 50 mg comprimits. Captopril 1mg/ml susp.oral (Fórmula magistral)</p>	<p>RN i RNPT: inici: 0,01 mg/kg/8-12h, augmentar fins max 0,5 mg/kg/dosis c/ 6-24h. Lactants i <12 a: inici: 0,15-0,3mg/kg/8-12h, augmentar máx. 6mg/kg/día c/6-12h. En >12a: 6.25- 12.5 mg/dosis c/12-24h. Dosis máx. 450 mg/día.</p>
<p>Enalapril 2.5; 5 , 10 i 20 mg comprimits. 1 mg/ml susp. Oral (Fórmula magistral)</p>	<p>RN: inicial 0,1mg/kg/c24h, augmentar max fins max 0.5mg/kg/día c/8-24h. 1m-12a: inicial 0.1mg/kg/ c/24h augm max fins 1 mg/kg/día c/12-24h, Adolescents: inicial 2.5mg/dosis c/24h, manteniment 10-20 mg/día c/12-24h (màx 40mg/dia)</p>
<p>Nifedipi 30mg (comprits liberac. prolongada) Nifedipi 4mg/ml susp. (Formula magistral)</p>	<p>0,1-0,2 mg/kg/12h, max 3 mg/dia. Dosis máxima 1-2 mg/kg/día (per HTA crónica intentar lliber prolog) HTA greu: formula alliberació immediata 0,04-0,25mg/kg/dosis (max 10mg/dosis c4-6h)</p>
<p>Amlodipi 5 y 10 mg comprimits Amlodipi 1 mg/ml susp. Oral (Fórmula magistral)</p>	<p><6 anys: 0,05-0,1 mg/kg/día (màx 10 mg) en dosis única. Augmentar setmanalment max fins 0.6mg/kg/día) >6 anys: 2,5 mg/día fins max 10 mg/día en dosis única.</p>
<p>Losartan 25, 50 y 100 mg comprimits. Losartan 2,5 mg/ml susp. Oral (Fórmula magistral)</p>	<p>Inicial 0,7 mg/kg c/24h (max 50mg/día). Augmentar fins máx. 1,4 mg/kg/día o 100mg/ día) c/24 -12h (Si pes entre 20 i 50 kg: Iniciar amb 25mg/24h)</p>
<p>Valsartan comp 80, 160 mg, 360 Valsartan 3mg/ml (Diovan).</p>	<p>>6 mesos i < 6 anys: Dosis inicial 1mg/kg/24h (max 4mg/kg/dia) ≥6 anys: Dosis inicial 0,65mg/kg/c12 hores (màx 40mg/dia) i augmentar fins max 1,35mg/kg/c12h (max 160mg/dia)</p>
<p>Hidralazina 20, 25 y 50 mg comprimits. (Hydrapres ®) Hidralazina 2mg/ml sol. oral (Fórmula magistral)</p>	<p>Inici: 0,75-1 mg/kg/día c/6-12h (màximo 25 mg/dosis) Màxima dosis de manteniment de 5 mg/kg /día en lactants i 7,5 mg/kg/día en nens.</p>