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EDITORIAL

# 2016 – European Society of Hypertension Guidelines for the management of high blood pressure in children and adolescents☆

## 2016 – Guías europeas para el manejo de la hipertensión arterial en niños y adolescentes: nuevos conceptos para un viejo problema

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The clinical perspective on blood pressure (BP) in the paediatric age group has changed in recent years as a consequence of it being measured regularly and an improved knowledge of the distribution of BP values and its changes during growth and development. This has allowed the detection of hypertension (HTN) in asymptomatic children and in the absence of underlying disease, and demonstrated that BP values in adolescents are indicative of the risk of developing HTN in young adulthood. The advances achieved in these areas, combined with an increase in the prevalence of obesity, the factor that has the greatest impact on BP elevation in adolescents, evinced the need to produce documents gathering the existing knowledge on the aetiology, assessment, outcomes, prognosis and treatment of HTN in this age group. In this regard, the European Society of Hypertension recognised this need and supported the development of the first European guideline for the Management of High Blood Pressure in Children and Adolescents, published in 2009.[1] Its diffusion inspired the performance of several studies that expanded our knowledge and opened up new horizons in our understanding of HTN and its impact on public health.

After seven years, it was necessary to assess the progress that had been made, which led to the elaboration of a new document in which European experts from different fields and different countries contributed their knowledge and experience, consolidated in the recently published Guidelines.[2] It may seem that the time elapsed was too short to generate enough findings and advances to justify the development of new guidelines. However, the exponential increase in the number of studies on various aspects of HTN in this age group amply warrants the effort. A review of recent studies on the prevalence and incidence of HTN, a new approach to the diagnosis of HTN, evidence on emerging causes of HTN, the introduction of new methods to measure BP, the relevance of different vascular phenotypes and early organ damage, the frequent association of HTN with other cardiovascular risk factors and advances in treatment are some of the clinically relevant aspects discussed at length in this document. The Guidelines also identified aspects of HTN that should be researched in the near future.[2]

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Given the variable *prevalence* of HTN, there must be an emphasis on establishing the *incidence* of HTN cases, something that is particularly advisable in individuals with normal-to-high BP values. The incidence is low in the general paediatric population, of 0.4 per 100 individuals per year, but it can be three to four times higher in special situations, for instance in children with obesity, diabetes, masked HTN, or those that have undergone surgical repair of aortic coarctation.

The *diagnosis of hypertension* has always been controversial as to the reference and cut-off values that ought to be applied. This debate has heated up in recent years due to the introduction of routine ambulatory BP measurements (automated 24-h BP monitoring or self-measurement at home). Given the challenges that these questions pose, experts agree on the need to reach practical solutions that would allow us to advance and to have more rigorous evidence in the future to support clinical decision-making in important areas, such as the diagnosis of a disease like HTN. For this reason, and despite their limitations, the reference values that are considered standard are the tables of the United States Task Force for office BP measurements and the European tables of Wühl and Stergiou[2] for ambulatory 24-h BP monitoring and home BP monitoring, respectively.

Having settled on these standards, another potential source of confusion is the cut-off values used to diagnose HTN in adolescents aged 16 years or more. If hypertension were to be defined as blood pressure at or above the 95th percentile for age, sex and height, a 16-year-old male with height at the 95th percentile would be categorised as hypertensive with a systolic BP of 137–140 mmHg, while a female of the same age and at the same height percentile would be categorised as hypertensive with a BP of only 132 mmHg. One or two years later, when no longer included in the paediatric group, the same female would be considered to have normal BP based on the criteria applied to adults. We would find even greater discrepancies in diagnosis for heights below the 95th percentile. Due to these differences in diagnosis, experts agree that starting at age 16 years, the cut-off values applied to both males and females should be those established for adults: normal-to-high, BP of 130–139/85–89 mmHg; and HTN, BP equal to or greater than 140/90 mmHg).

In recent years, there has been growing interest in a form of HTN known as *isolated systolic hypertension* in youth. It is defined as an elevated systolic BP with a normal diastolic BP, and its mechanisms, impact and whether it should be treated with antihypertensive drugs are under discussion.[3] While it was initially interpreted as an extreme expression of vascular elasticity, recent studies underscore its complexity and the heterogeneity of its underlying mechanisms. The introduction of noninvasive methods for measuring central aortic BP has demonstrated that aortic BP is particularly low in many of these adolescents, and some authors even consider that HTN should be considered ''spurious'' in these individuals. It is clear that long-term studies must be conducted to better understand the significance of this entity and how to identify the cases that require pharmacological intervention. In the meantime, ambulatory BP monitoring[4,5] and the presence of early end-organ damage, especially in the left ventricle, may help guide clinical decision-making.

The introduction of *ambulatory BP monitoring* has led to discrepancies in the diagnosis of HTN and the coining of two terms, 'white-coat' HTN and 'masked' HTN. At present, their clinical significance is unclear, and it is generally considered that in the absence of organ damage, their presence warrants the follow up of children due to the risk of developing sustained HTN (office and ambulatory), a risk that is higher for masked HTN than for white-coat HTN. The Guidelines also specify the indications for ambulatory 24-hour BP monitoring and home BP monitoring.

The importance of identifying *early changes in target organs* has been demonstrated in the past few years, as their presence determines the prognosis and need for pharmacological intervention. The first such changes to be assessed were remodelling and hypertrophy in the left ventricle, and in recent years, the quantification of albuminuria and the estimation of vascular phenotype parameters such as pulse wave velocity and carotid artery intima-media thickness have also been introduced. In this regard, we ought to mention the frequent *association of HTN with other cardiovascular and metabolic risk factors*, such as insulin resistance, low levels of HDL cholesterol and hyperuricaemia, which are also factors influencing in early organ damage.

Lastly, the Guidelines establish the BP treatment objectives that need to be achieved, as well as recommendations for pharmacological and nonpharmacological treatment in the general paediatric population and in patients with special conditions relevant to HTN, such as chronic renal disease or diabetes mellitus. Traditionally, children with HTN have been therapeutic orphans because few studies have been conducted on the efficacy and safety of specific drugs in this age group. Due to the importance of having specific studies of the paediatric age group, the European Union published the *Regulation of Medicinal Products for Paediatric Use* (EU Regulation 1901/2006/EC) and the *Paediatric Use Marketing Authorisation* (PUMA; Art 40, EU Regulation) in 2006, offering incentives and market protection for drugs tested for use in the paediatric population. These changes in legislation have led to a substantial increase in the number of studies, although these have generally been limited to newly developed antihypertensive agents.

Hypertension guidelines for children and adolescents are indispensable to paediatricians. Improvements in the prevention and management of HTN in the paediatric age group will improve the health of our population through their future impact in reducing cardiovascular and renal disease in adulthood.

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