

Hypertensive Emergencies

Definition / Supporting Information

Hypertension is a systolic or diastolic blood pressure (BP) > 95th percentile for sex, age, and height, measured using an appropriate-sized cuff on three separate occasions.

- See [The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents \(PDF\)](#) as an example of blood pressure centiles used in the UK and US

Accelerated (malignant) hypertension is characterised by marked increases in systolic and diastolic BP and signs of papilloedema and / or retinal haemorrhage (hypertensive retinopathy). This is a medical emergency.

Note - Using the proper size of cuff is important:

- The cuff should have an inflatable bladder width \geq 40% of the upper arm at a point midway between the olecranon and the acromion; the cuff bladder length should be approximately 80–100% of the circumference of the upper arm.
- If the cuff is too small, BP may be overestimated, so the next largest cuff should be used instead.

Keywords / also known as: raised blood pressure

Essential History

Evaluation should progress only after the ABCs (airway, breathing, and circulation) of resuscitation have been addressed.

Ask about:

- Duration and onset of hypertension, if known
 - Degree of compliance with antihypertensive therapy
- Other medications, including anti-inflammatory agents, immunosuppressive treatment, stimulants, and recreational drugs
- Features that may be suggestive of renal causes of hypertension
 - Urinary tract infections and / or enuresis
 - Faltering growth
 - Haematuria
 - Oliguria
 - Oedema
 - Previous umbilical artery catheterisation
 - Rash and / or joint pains

- Features that may suggest endocrine causes of hypertension
 - Cushingoid features
 - Intermittent palpitations and flushing
 - Weight loss
- Features that may suggest cardiac causes of hypertension
 - History of known cardiac disease
 - Dyspnoea on exertion
 - Fatigue
- Features suggestive of syndromic causes of hypertension, eg:
 - Neurocutaneous markers
 - Family history of neurofibromatosis or Von Hippel-Landau syndrome

‘Red Flag’ Symptoms and Signs

Evaluation should progress only after the ABCs (airway, breathing and circulation) of resuscitation have been addressed.

Ask about:

- Signs of raised intracranial pressure
 - Altered mental status, drowsiness, and / or behavioural change
 - Headaches (including characterisation)
 - Visual disturbances
 - Seizures
 - Nausea
 - Vomiting

Look for:

- Evidence of abnormal neurological examination:
 - Weakness and / or hypotonia
 - Hypertonia, hyper-reflexia, clonus and / or upgoing plantar reflexes
 - Retinal haemorrhage and / or papilloedema
 - Abnormal cranial nerve function
- Congestive heart failure
 - Evidence of pulmonary oedema
 - Hepatomegaly
 - Raised jugular venous pressure
 - Gallop rhythm
- Discrepancy between BP measurements in the upper and lower extremities
 - Coarctation of aorta

- Renal artery bruit
 - Renal artery stenosis

Investigations

Investigations should progress only after the ABCs (airway, breathing and circulation) of resuscitation have been addressed, and should be tailored according to the history and clinical findings.

To be undertaken by non-specialist practitioners (eg, General Practitioner (GP) Team) or specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology / Paediatric Intensive Care Team(s)):

- Full blood count
- Urea and electrolytes
- Serum calcium, phosphate and albumin
- Inflammatory markers eg, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR)
 - May indicate systemic disease eg, vasculitis
- Urinalysis
 - Nitrites
 - Leucocytes
 - Blood (see Haematuria)
 - Protein on dipstick
- Electrocardiography (ECG)

To be undertaken by specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology / Paediatric Intensive Care Team(s)):

- Biochemistry tests for diagnosis of primary or secondary hypertension
 - Plasma renin and aldosterone
 - Cortisol and thyroid function
 - Urine catecholamines
 - Serum C3 complement, antistreptolysin O titre, and antinuclear antibody
 - (Consider) Anti Neutrophil Cytoplasmic Antibodies (ANCA)
- Imaging tests for diagnosis of primary or secondary hypertension
 - Chest radiography
 - Renal ultrasonography with Doppler studies
 - Renal angiography
- Tests for target organ injury
 - Echocardiography

Treatment Approach

Treatment should progress only after the ABCs (airway, breathing and circulation) of resuscitation have been addressed.

To be undertaken by specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology / Paediatric Intensive Care Team(s)):

- Symptomatic hypertensive emergencies should be treated without delay to avoid further damage to vital organs:
 - Vascular access should be established immediately
 - Patients should undergo cardiac and continuous BP monitoring, preferably by intra-arterial catheter
 - Urine output should be monitored from the outset
 - Any serious complications must be managed before or as hypertension is being treated (eg, anticonvulsants should be administered to a seizing patient along with antihypertensive medications)
 - The goal is to lower BP promptly but gradually
 - A sudden decrease can lead to neurological complications (eg, intracranial bleeding (see Stroke))
 - Avoid short acting Nifedipine as this may precipitate a sudden uncontrolled drop in BP
 - The initial goal of therapy is to reduce mean arterial pressure by approximately 25% over the first 24 hours
 - If the BP drops more rapidly on initiation of treatment then volume expansion with isotonic sodium chloride must be considered

Specific Treatment

According to local experience, choose from:

- Sodium nitroprusside
 - Dose
 - 0.5 micrograms/kg/minute, by intravenous infusion
 - Onset
 - Instantaneous
 - Duration of action
 - Only during infusion
 - Side-effects
 - Headache
 - Chest and abdominal pain
 - Disadvantages
 - Patients require close observation
 - May be inappropriate in the emergency department

- Requires 10 minutes to prepare and is photosensitive
- Potential exists for cyanide accumulation
- Hydralazine hydrochloride
 - Dose
 - 12.5–50 micrograms/kg/hour by intravenous infusion (maximum 3 mg/kg in 24 hours for children > 1 month)
 - Side-effects
 - Tachycardia
 - Headache
 - Flushing
 - Vomiting
 - Disadvantage
 - May require the introduction of a β -blocker
- Labetalol hydrochloride
 - Dose
 - 0.5-1 mg/kg/hour by intravenous infusion adjusted every 15 minutes according to response to max. 3 mg/kg/hour
 - Side-effects
 - Gastrointestinal upset
 - Scalp tingling
 - Headache
 - Sedation
 - Disadvantage
 - May precipitate bronchospasm in children with an asthma history.

When to Refer

Refer urgently to specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology Team(s)) if:

- Any 'red flag' signs or symptoms

Escalate care to Paediatric Intensive Care or Paediatric Nephrology Team(s) if:

- Emergency management of hypertension requires intravenous treatment
 - Intravenous agents are generally administered in high dependency units, renal wards or paediatric intensive care units

'Safety Netting' Advice

- All patients treated for a hypertensive emergency should be followed-up by non-specialist practitioners (eg, GP Team) and / or specialist practitioners (eg, General Paediatric / Paediatric Nephrology Team(s)) for BP monitoring and management of medications.

- Complications of hypertensive emergencies include:
 - Seizure disorders
 - Cranial nerve palsies
 - Stroke, hemiplegia
 - Blindness
 - Cardiomyopathy
 - Progressive renal damage

Patient / Carer Information

****Please note: whilst these resources have been developed to a high standard they may not be specific to children.***

- [Hypertension \(high blood pressure\)](#) (Web page), infoKID
- [Hypertension in childhood](#) (Web page), Patient
- [High blood pressure \(hypertension\)](#) (Web page), the NHS website

Resources

National Clinical Guidance

Definition of accelerated hypertension from: [Hypertension in adults: diagnosis and management](#) (Web page), NICE guideline NG136, National Institute for Health and Care Excellence

Suggested Resources

****Please note: these resources include links to external websites. These resources may not have national accreditation and therefore PCO UK cannot guarantee the accuracy of the content.***

[Nifedipine for high blood pressure](#) (Web page), Medicines for Children

Jackson LV, Thalange NKS, Cole TJ. Archives of Disease in Childhood Blood pressure centiles for Great Britain. Arch Dis Child. 2007;92:298-303 [[PubMed](#)]

Lurbe E, Cifkova R, Cruickshank JK et al. Management of high blood pressure in children and adolescents: recommendations of the European Society of Hypertension J Hypertens. 2009;27:1719-1742 [[PubMed](#)]

Patel NH, Romero SK, Kaelber DC. Evaluation and management of pediatric hypertensive crises: hypertensive urgency and hypertensive emergencies. Open Access Emergency Medicine 2012;4:85–92 [[PubMed](#)]

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