



Hypertensive Emergency in Children

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1. Definition Hypertensive Emergency

Severe hypertension associated with acute target-organ damage.

Target-organ damage may involve:

Brain

Encephalopathy, seizures, stroke

Heart

Heart failure

Kidneys

Acute kidney injury

Eyes

Papilledema, retinal hemorrhage



This is a medical emergency requiring PICU admission and IV antihypertensive therapy.

1. Clinical Presentation

Symptoms

- Severe headache
- Persistent vomiting
- Blurred vision
- Seizures
- Irritability
- Chest pain
- Dyspnea
- Reduced urine output

Signs

- Very high BP (>95th percentile + acute organ injury)
- Altered mental status
- Papilledema
- Retinal hemorrhage
- Focal neurological deficit
- Heart failure
- Pulmonary edema
- Acute kidney injury



Important History

Ask about:

- Previous hypertension
- Kidney disease
- Congenital heart disease
- Recent medications
 - Steroids
 - Decongestants
 - Oral contraceptives
 - Stimulants
- Drug intoxication
- Hematuria
- Edema
- Head trauma
- Pregnancy (adolescents)

Physical Examination

Always assess:

✓ BP in both arms

✓ Height

To interpret BP percentile

✓ Weight

✓ Neurological examination

✓ Fundoscopy

✓ Cardiac examination

✓ Signs of heart failure

✓ Peripheral pulses

✓ Edema

✓ Abdominal mass or bruit

1. Diagnostic Approach

Step 1 — Confirm Hypertension

Repeat BP using:

Correct cuff size

Manual measurement if possible

Calm child

Step 2 — Is There Evidence of Acute Target-Organ Damage?

Neurologic

- Seizure
- Encephalopathy
- Altered consciousness

Cardiac

- Heart failure
- Pulmonary edema

Renal

- Acute kidney injury
- Oliguria

Eye

- Papilledema
- Retinal hemorrhage

If YES → Hypertensive Emergency



PICU + IV antihypertensive

1. Differential Diagnosis

Diagnosis	Clues
Hypertensive urgency	Severe BP but no organ damage
Renal disease	Hematuria, edema
Acute glomerulonephritis	Recent infection
Hemolytic uremic syndrome	Anemia + thrombocytopenia
Coarctation of aorta	Weak femoral pulses
Pheochromocytoma	Episodic headache, sweating
Drug intoxication	History of ingestion
Increased intracranial pressure	Bradycardia, abnormal neurology
Pain/anxiety	Mild transient BP elevation

1. Essential Investigations — Initial

✓ CBC

✓ Electrolytes

✓ Urea

✓ Creatinine

✓ Urinalysis

✓ Blood glucose

Cardiac Investigations

ECG

Chest X-ray

Echocardiography

If indicated

Neurologic Investigations

If neurological symptoms:

Brain CT

Acute

MRI

When stable



Ophthalmology

Fundoscopy

Additional Investigations (After Stabilization)

According to suspected cause:

Renal ultrasound

Doppler renal arteries

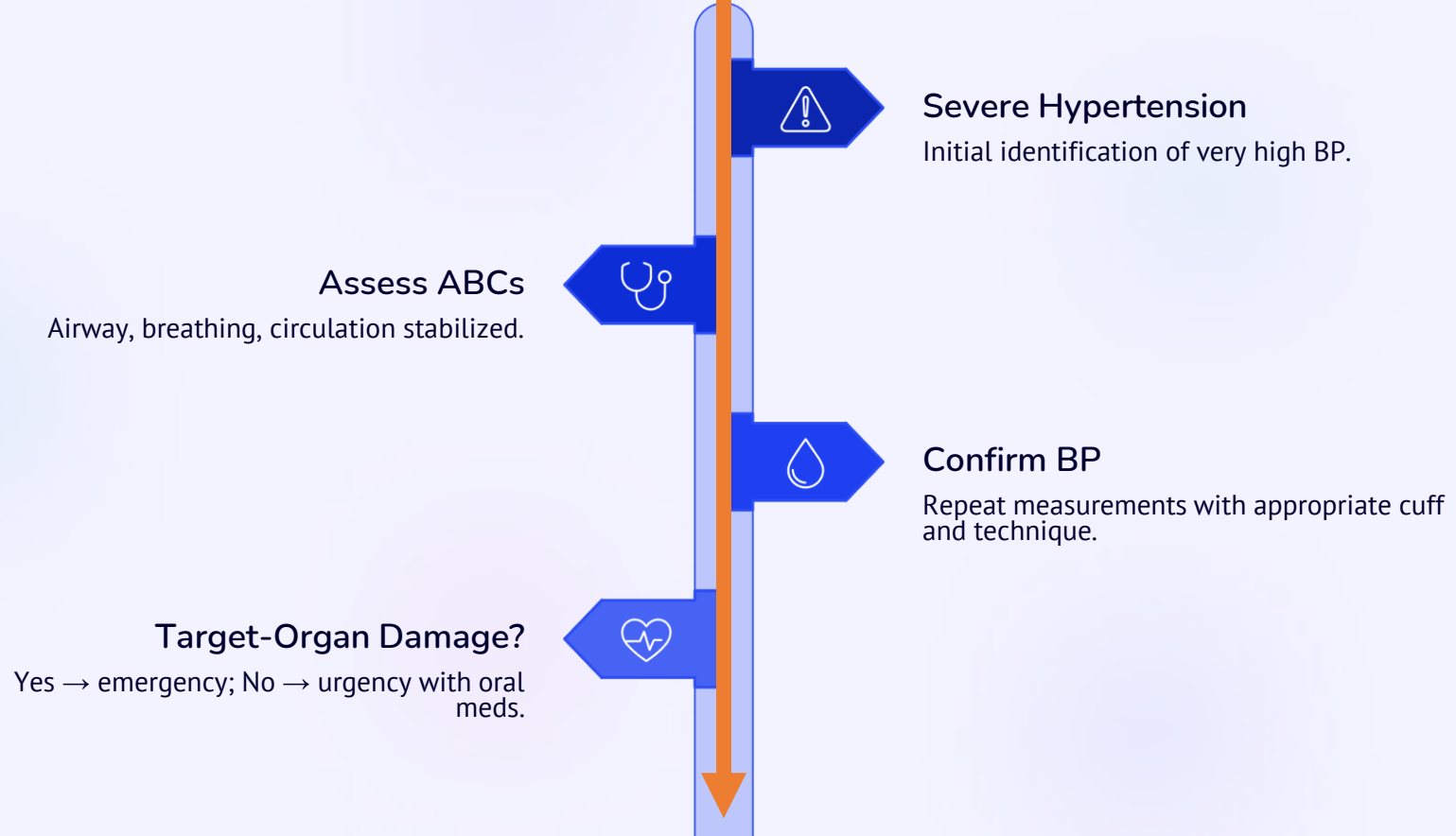
Plasma renin

Aldosterone

Plasma/urine metanephrines

Autoimmune work-up

1. Management Algorithm



Blood Pressure Reduction Goal

⊗ Never normalize BP rapidly.

Recommended:

First 8 hours

↓ BP by $\leq 25\%$ of planned reduction

Next 24–48 hours

Gradually normalize BP.

Rapid reduction may cause:

- Stroke
- Cerebral ischemia
- Renal ischemia

1. Drug Summary Table

Drug	Route	Comments
Nicardipine	IV infusion	First-line in many centers
Labetalol	IV bolus/infusion	Avoid in asthma and heart failure
Esmolol	IV infusion	Useful for selected cardiac conditions
Hydralazine	IV	Variable response
Sodium nitroprusside	IV infusion	Effective but requires ICU monitoring; prolonged use may cause cyanide toxicity
Nifedipine (immediate-release)	Oral	Not recommended due to unpredictable rapid BP reduction

Common Pediatric IV Doses (General Review)

Drug	Dose
Nicardipine	0.5–5 mcg/kg/min IV infusion
Labetalol infusion	0.25–3 mg/kg/hr
Labetalol bolus	0.2–1 mg/kg IV (max 40 mg)
Hydralazine	0.1–0.2 mg/kg IV (max 20 mg)
Esmolol	100–500 mcg/kg loading (optional), then 50–300 mcg/kg/min



Dose adjustments and titration should be supervised in PICU.

1. Admission Criteria

All hypertensive emergencies require admission.

PICU indications:

Neurological symptoms

IV antihypertensive infusion

Seizure

Heart failure

Pulmonary edema

Acute kidney injury

Continuous BP monitoring

1. Referral Criteria

Urgent referral to:

Pediatric intensive care

Pediatric nephrology

Pediatric cardiology

Pediatric neurology

Neurological involvement

Pediatric endocrinology

Suspected endocrine hypertension

1. Follow-Up

After stabilization:

- Monitor BP regularly
- Identify underlying cause
- Adjust oral antihypertensive therapy
- Assess renal function
- Urinalysis
- Echocardiography if cardiac involvement
- Fundoscopy if retinal changes
- Reinforce medication adherence and lifestyle measures



1. Clinical Pearls

-  Severe hypertension alone is not hypertensive emergency.
-  Organ damage defines hypertensive emergency.
-  Most pediatric hypertensive emergencies have a secondary cause (especially renal disease).
-  Kidney disease is the commonest cause.
-  Always examine the fundus.
-  Always check femoral pulses.
-  Confirm BP with correct cuff size.
-  ICU monitoring is essential during IV therapy.

1. Common Mistakes in Exams and Practice

✗ Treating BP number instead of clinical condition

✗ Lowering BP too quickly

✗ Forgetting fundoscopy

✗ Using an incorrect BP cuff size

✗ Missing coarctation by not checking femoral pulses

✗ Assuming anxiety alone explains markedly elevated BP

✗ Discharging a child with suspected hypertensive emergency

✗ Using immediate-release nifedipine because of its unpredictable hypotensive effect

1. Key Take-Home Messages

01

Hypertensive emergency = severe hypertension + acute target-organ damage.

03

Confirm BP using the correct cuff size and repeat measurements.

05

Evaluate for brain, heart, kidney, and eye involvement in every patient.

07

Admit all patients to the PICU for continuous monitoring and IV antihypertensive therapy.

09

Preferred IV agents include nicardipine and labetalol; avoid immediate-release nifedipine.

02

Neurologic symptoms (headache, seizures, altered mental status) are common presenting features.

04

Most pediatric cases are secondary hypertension, commonly due to renal disease.

06

Initial investigations include CBC, electrolytes, creatinine, urinalysis, ECG, and fundoscopy.

08

Reduce BP gradually—no more than about 25% of the planned reduction in the first 8 hours—to avoid cerebral and renal ischemia.

10

After stabilization, identify and treat the underlying cause and arrange specialist follow-up.

Rapid Examination Box (1-Minute Review)

Question	Answer
Definition?	Severe hypertension with acute target-organ damage
Most common cause?	Secondary hypertension, especially renal disease
First investigation?	Confirm BP with the correct cuff and assess for target-organ injury
Initial treatment?	ABCs, PICU admission, IV antihypertensive infusion
BP reduction target?	Gradual; $\leq 25\%$ of the planned reduction in the first 8 hours
First-line IV drugs?	Nicardipine, labetalol
Drug to avoid?	Immediate-release nifedipine
Admission?	All hypertensive emergencies require PICU admission