

# Hypertensive Emergencies in the Pediatric ED

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A 16 yo F known Type I DM comes into the ED with new onset headaches since this morning. The patient's mom tells you that she is compliant with her insulin regimen, as the patient was diagnosed when she was 2 years of age. Vital signs are BP 150/110, HR 85, RR 18, O2 Sat 99% room air, T 37.3C, POC glucose 105. The blood pressure is repeated 3 times, the readings as follows: 152/108, 152/106, 150/108, which are all above the 99%ile for her age and height. You verified that the right sized cuff was used for the patient. PE reveals bilateral papilledema, no focal weakness. CBC, CMP, UA, chest x-ray are pending.

## What is your next step in management?

- A. Start labetalol IV with target reduction of BP by no more than 25% in the first 8 hours of treatment
- B. Start ACE inhibitor, reduce by 25% within the first 8 hours of treatment
- C. Start nicardipine IV, reduce by 30% within the first 8 hours of treatment
- D. Start hydralazine, reduce by 20% in first hour and 10% more in the next 3 hours.
- E. Start furosemide with target reduction of BP by 25% in the first hour and 5% more in the next 3 hours.

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- A is correct. Labetalol is typically used in children and adolescents for hypertensive emergencies. Initial bolus of 0.2 to 1mg/kg (max dose 40mg) followed by a continuous infusion of 0.25 to 3mg/kg per hour. However, labetalol should be initiated cautiously in pediatric patients by using the lower doses listed. To effectively and safely lower blood pressure in hypertensive emergencies, it is recommended to lower blood pressure no greater than by 25% over 8 hours. Lowering blood pressure too rapidly can cause irreversible organ damage.

- ACE inhibitors are not commonly used in hypertensive emergencies as their efficacy requires a longer time than required for these situations.
- Nicardipine can also be used in hypertensive emergencies with the initial dose of 0.5 to 1mcg/kg per minute and also titrating dose according to blood pressure. The rate of infusion can be may be increased every 15-30 minutes, maximum dose is 4 to 5 mcg/kg per minute. Bolus studies have not been studied in children.

- Hydralazine is an acceptable alternative to bolus-dose labetalol, although onset of action is slower than nicardipine or labetalol and duration of action is longer than either of these medications.
- Furosemide can be used in conjunction with antihypertensive treatment for those patients who require diuretic therapy. It should never be used alone, however.

- A 5 yo M with PMH of mild intermittent asthma comes into ED after parents found him seizing at home. Mom is not sure how long the seizure lasted, but was lethargic once seizure ended. Mom says he recently had a throat infection about 2 weeks ago and no medications were given. His only medications are albuterol as needed for wheezing and pulmicort.



- Vital signs are 117/79, HR 80, T 37C, RR 20, O2Sat at 100% on RA, POC glucose 95. On PE, the patient continues to be lethargic, no other neurological findings, no carotid bruits or abdominal masses palpated. Labs are pending. You ask for blood pressures to be repeated, and they continue to be elevated above 99%ile for his age group and height.

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- A. Start labetalol IV with target reduction of BP by no more than 25% in the first 8 hours of treatment.
- B. Start nicardipine IV, reduce by 25% within the first 8 hours of treatment.
- C. Order a head CT to rule out any mass lesions or trauma
- D. Start lorazepam IV for continuous control of seizures
- E. Start mannitol IV 0.25-1 g/kg/dose and repeat every 6-8 hours as needed

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- C is correct. Given this patient's history, it is likely that he developed post-streptococcal glomerulonephritis, which may cause serious complications including severe hypertension. However, since the patient was found seizing and unresponsive by parents, it is imperative to rule out any head trauma or mass lesion as the underlying cause of neurologic symptoms prior to initiating treatment for a hypertensive emergency. Starting antihypertensive therapy for a child with head trauma or mass lesion can lead to cerebral ischemia.

- Labetalol is one of the medications used for hypertensive emergencies. However, given this patient's history of asthma, it would be better to use nicardipine, which is a calcium channel blocker, unlike labetalol, which has both beta and alpha adrenergic blocker properties and may cause bronchospasms.

- Labetalol should also be avoided in patients with decreased ventricular function or high-degree heart block. Other reported side effects include fatigue, nausea, vomiting, itching, rash hepatotoxicity, and possible hyperkalemia in renal transplant patients. Hypoglycemia may also occur in association with labetalol.

- Lorazepam can be used for seizures, with an initial dose 0.05 to 0.1mg/kg. However, it will not rectify the patient's underlying condition, which is the main cause of his new onset seizures.
- Mannitol is an osmotic diuretic used for patients presenting with intracranial pressure secondary to cerebral edema. Although this patient's ICP and hypertension can be explained by cerebral edema, head trauma and mass lesion should be ruled out before administering drugs to correctly identify the patient's underlying illness.

# References

- Jill M. Baren *Pediatric Emergency Medicine* copyright 2008
- [http://www.nhlbi.nih.gov/guidelines/hypertension/child\\_tbl.pdf](http://www.nhlbi.nih.gov/guidelines/hypertension/child_tbl.pdf)
- UpToDate: Approach to hypertensive emergencies and urgencies in children
- Management of hypertensive emergencies and urgencies in children