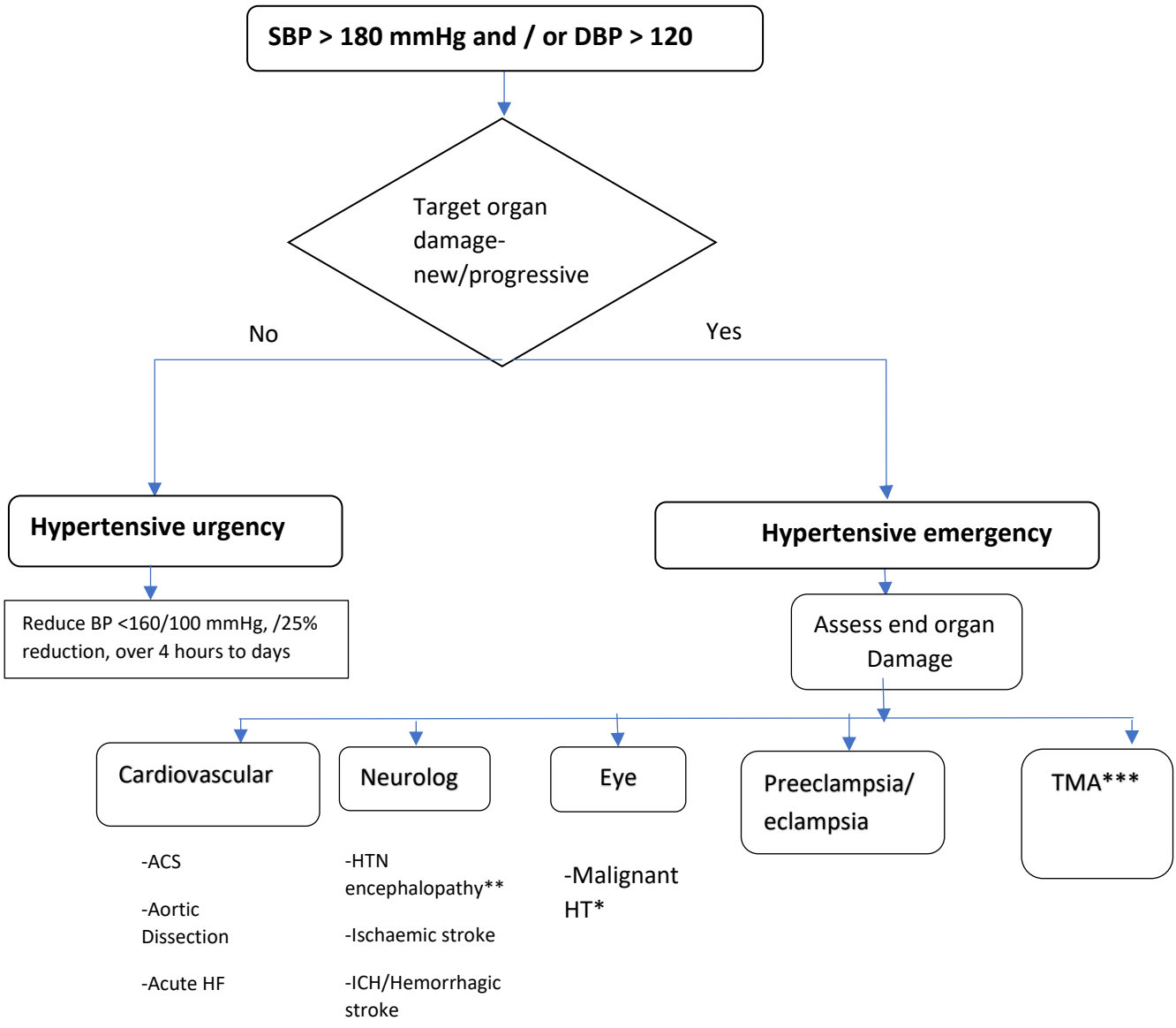
`HYPERTENSIVE EMERGENCIES

Definition

Situations where very high BP values are associated with **acute** hypertension- mediated organ damage, and therefore require immediate BP reduction to limit extension/ promote regression of target organ damage

No specific BP threshold to define HT emergencies



* Malignant hypertension: Severe BP elevation (commonly >200/120 mm Hg) associated with advanced bilateral retinopathy (hemorrhages, cotton wool spots, papilledema).

**Hypertensive encephalopathy: Severe BP elevation associated with lethargy, seizures, cortical blindness and coma in the absence of other explanations.

***Hypertensive thrombotic microangiopathy: Severe BP elevation associated with hemolysis and thrombocytopenia in the absence of other causes and improvement with BP-lowering therapy.

If severe hypertension →urgent assessment (target organ/causative factors)

- Secondary causes can be found in 20%–40% of patients presenting with malignant hypertension

- **Heart-**
    - **MI**- inquire about chest pain, ECG, troponin I
    - **Dissection**- check BP both upper limbs, ECG, bedside echo, CXR, CT aortogram
    - **Heart failure**- lung crepitations, elevated JVP, gallop rhythm- ECG, 2D echo, CXR, BNP levels
- **Eye**- Fundoscopy- papilledema, HTN changes – exudates/ flame hemorrhage
- **Neurology**- **Encephalopathy**: General- Headache, Fluctuation of consciousness, visual disturbances, seizures
- **Haematology**- **MAHA/DIC**- FBC(Hb, Plt), blood picture, fibrinogen level, Coagulation profile, LDH
- **Renal**- **AKI**- check UOP, uremic features- RFT, UFR/UPCR, SE, Renal Ultrasound & Renal doppler

If severe hypertension →Look for causative factors/precipitants

- Medical history: preexisting hypertension, onset and duration of symptoms, potential causes (nonadherence with prescribed antihypertensive drugs)
- Toxins and medications- Cocaine, medications- amphetamines, NSAIDS, steroids, immunosuppressants
- Medication withdrawal- clonidine, beta blockers. Medication related- serotonin syndrome/NMS- Drugs levels, toxicology studies
- Endocrine- Thyrotoxicosis, pheochromocytoma, Cushing's, Cons- SE, TSH, Metanephrines, cortisol
- Renal- AGN, CKD, renovascular
- Raised ICP-nausea/vomiting, head injury, drugs, SOL, meningitis, vascular events- NCCT brain, MRI brain

- Autonomic disturbances- GBS, spinal cord pathology

MANAGEMENT

Hypertensive Urgency

Target- around <160/100 mmHg, in very high pressures target- 25 % reduction
Time duration- over 4 hours to days. (Individual targets- those with risk of imminent CV event lower and faster blood pressure reduction).
Drugs- oral drugs preferred:

- captopril (start 25 mg daily up to 150mg/day
- amlodipine (2.5 mg/day up to 10 mg/day)
- other first line drugs (combinations are preferred)

Other measures: explain to the patient, keep in a quiet environment, salt restriction

Monitoring:

For symptoms of target organ involvement, blood pressure, heart rate, lung auscultation, fluid balance.
In the long term the blood pressure should be further reduced to achieve the target (140/90 or 130/80)

Plan on discharge-

1) Antihypertensive-
    a. Those on treatment- Reinstitution of prior medications (avoid drugs causing rebound hypertension in non-adherents), increase the dose of existing medications, addition of diuretics.
    b. Untreated hypertension- depending on intrinsic and extrinsic factors start- CCB/ACEI/ARB/diuretics etc. Combination of two drugs preferred.
2) Diet- low salt diet
3) Other lifestyle measures

Hypertensive emergency

Key considerations in defining the treatment strategy

1. Establishing the target organs that are affected, whether they require any specific interventions other than BP lowering, and whether there is a precipitating cause for the acute rise in BP that might affect the treatment plan (e.g. pregnancy,thrombolysis)

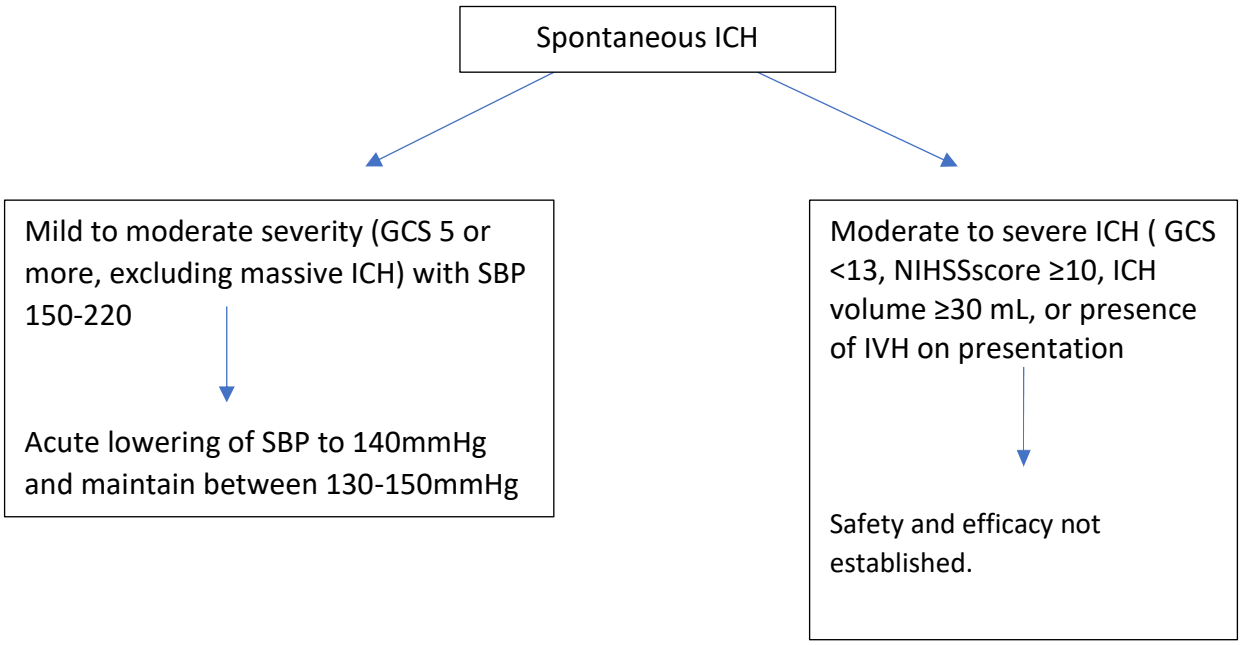
2. The recommended timescale and magnitude of BP lowering required for safe BP reduction
3. The type of BP-lowering treatment required

- Managed in HDU/ICU
- Labetalol and nicardipine safe for all generally

Clinical presentation	**Target BP**	**Treatment**
Malignant hypertension with or without acute renal failure	Several hours Reduce MAP 20-25%	Labetalol, Nicardipine Nitroprusside
Hypertensive encephalopathy	Immediately reduce MAP by 20-25%	Labetalol, nicardipine Nitroprusside
Acute coronary syndrome	Immediately reduce SBP <140 mmHg	Nitroglycerine, Metoprolol / esmolol, Clevidipine, Nicardipine. (Avoid – hydralazine)
Acute cardiogenic pulmonary edema	Immediately reduce SBP <140 mmHg	Nitroglycerine, loop diuretics, Sodium nitroprusside (Avoid- BB, Hydralazine)
Acute aortic dissection	Immediately reduce SBP < 120 mmHg and heart rate 60 bpm	BB- Labetalol, metoprolol, esmolol Vasodilator- nitroglycerine, hydralazine, Clevidipine
Eclampsia and severe preeclampsia/HELP	Reduce MAP by no more than 25 % over two hours to achieve target blood pressures of 130 to 150 mmHg systolic and 80 to 100 mmHg diastolic. Immediately reduce SBP to < 160 mmHg and DBP to < 105 mmHg (ESC)	IV: Hydralazine, labetalol, Nicardipine Magnesium sulfate Oral- Nifedipine, Methyldopa Give oral drugs (nifedipine 10 mg) until IV access is secured (avoid- Atenolol, ACEI/ARB, MRA and Nitroprusside) Delivery
Ischaemic Stroke	For thrombolysis <185/110 & maintain at <180<105 mmHg Non-reperfusion < 220/120	Nicardipine, Labetalol, Clevidipine
Intracranial Hemorrhage/ Hemorrhagic stroke	See below	Nicardipine, Labetalol

Intracranial haemorrhage

Sustained acute BP lowering avoiding large variations in SBP
Initiating treatment within 2h of onset and achieving control in 1 hour is beneficial



ICH+ SBP >220→ no sufficient data on acute BP lowering

Eclampsia and severe preeclampsia/HELLP:

(1) SBP> 140 mm Hg /DBP> 90 mm Hg or higher, on two occasions at least 4 hours apart
(2) SBP >170 mm Hg systolic and/or >110 mm Hg diastolic: immediate hospitalization is indicated (emergency)

Preeclampsia

In addition to the blood pressure criteria, proteinuria,

1) > 0.3 grams in a 24-hour urine specimen,

2) UPCR> 0.3 or higher, or
3) Urine dipstick protein of 1+

Severe when SBP > 160 / DBP> 110 mmHg, impaired renal, hepatic function, PLT<100, impaired visual or neurological function and pulmonary edema, abdominal pain, nausea vomiting or low UOP

Treatment

- Intravenous labetalol (alternative intravenous nicardipine, esmolol, hydralazine, urapidil) oral methyldopa or DHP-CCBs (nifedipine [not capsular] nicardipine)
- Add magnesium (hypertensive crisis to prevent eclampsia)
- In pulmonary edema: nitroglycerin intravenous infusion
- Sodium-nitroprusside -avoid due to the danger of fetal cyanide poisoning with prolonged treatment
- Immediately reduce SBP to < 160 mmHg and DBP to < 105 mmHg (ESC)
- Monitor fetal HR, To prevent foetal bradycardia, the cumulative dose of labetalol should not exceed 800 mg/24 h
- Expedite delivery in women with visual disturbances, hemostatic disorders, asymptomatic at 37 weeks

Suspect sympathetic overactivity

1. alfa 2 agonist/beta blocker withdrawal
2. ingestion of sympathomimetic (methamphetamine, cocaine)
3. pheochromocytoma
4. autonomic disturbance

- Avoid betablockers alone (except beta blocker withdrawal).
- Use alfa blockers first such as- (Phentolamine- 5 mg IV repeat if necessary q2-4hr up to 15 ml),or use labetalol or nitroprusside.

Annex

Drug types, doses, and characteristics for treatment of hypertension emergencies

Labetalol: IV 2mg/min (max 2.4 g/day) or 10-20 mg dose over 1 min, repeated in 5 min, with increasing the dose (max 200)

Nicardipine: 3-5 mg/hour, increase 1mg every 15 min (max-15mg/hour)

Nitroprusside- 0.5-1.5 mcg/kg/min, adjust 0.5 mcg/kg/min every 5 min

Nitroglycerine- 10-200mcg/min (max per dose- 400 mcg/min)

Loop diuretics- bolus 50-100 mg, infusion start 5mg/hour, (max-1.5 g/day)

Metoprolol- 5 mg over 5 min. repeated every 5 min to a max dose of 10-15 mg

Magnesium sulfate: for prevention of seizures in preeclampsia
4g (diluted in 250 mL NS/D5W) IV loading dose & 1-2 g/hr IV; may administer 4hrly as necessary

Drug	Onset of action	Duration of action	Dose	Contraindications	Adverse effects
Esmolol	1–2 min	10–30 min	0.5–1 mg/kg as i.v. bolus; 50–300 lg/kg/min as i.v. infusion	Second or third-degree AV block, systolic heart failure, asthma, bradycardia	Bradycardia
Metoprolol	1–2 min	5–8 h	2.5–5mg i.v. bolus over 2 minutes - may be repreated every 5 minutes to a maximum dose of 15mg	Second or third-degree AV block, systolic heart failure, asthma, bradycardia	Bradycardia
Labetalol	5–10 min	3–6 h	0.25–0.5 mg/kg i.v. bolus; 2–4 mg/min infusion until goal BP is reached, thereafter 5–20 mg/h	Second or third-degree AV block; systolic heart failure, asthma, bradycardia	Bronchoconstriction, foetal bradycardia
Fenoldopam	5–15 min	30–60 min	0.1 mg/kg/min i.v. infusion, increase every 15 min with 0.05 - 0.1 lg/kg/min increments until goal BP is reached	Caution in glaucoma	
Clevidipine	2–3 min	5–15 min	2 mg/h i.v. infusion, increase every 2 min with 2 mg/h until goal BP		Headache, reflex tachycardia
Nicardipine	5–15 min	30–40 min	5–15 mg/h i.v. infusion, starting dose 5 mg/h, increase every 15–30 min with 2.5 mg until goal BP, thereafter	Liver failure	Headache, reflex tachycardia

			decrease to 3 mg/h		
Nitroglycerine	1–5 min	3–5 min	5–200 lg/min i.v. infusion, 5 lg/min increase every 5 min		Headache, reflex tachycardia
Nitroprusside	Immediate	1–2 min	0.3–10 lg/kg/min i.v. infusion, increase by 0.5 lg/kg/min every 5 min until goal BP	Liver/kidney failure (relative)	Cyanide intoxication
Enalaprilat	5–15 min	4–6 h	0.625–1.25 mg i.v. bolus	History of angioedema	
Urapidil	3–5 min	4–6 h	12.5–25 mg as bolus injection; 5–40 mg/h as continuous infusion		
Clonidine	30 min	4–6 h	150–300 mg i.v. bolus over 5–10 min		Sedation, rebound hypertension
Phentolamine	1–2 min	10–30 min	0.5–1 mg/kg i.v. bolus OR 50–300 mg/kg/min as i.v. infusion		Tachyarrhythmias, chest pain

References

1) 2020 AHA guideline- Global Hypertension Practice Guideline
2) 2018 ESC/ESH Guidelines for the management of arterial hypertension
3) 2020 Hypertension guideline on American College of Obstetricians and Gynecologists
4) 2022 Guideline for the Management of Patients with Spontaneous Intracerebral Hemorrhage: American Heart Association/American Stroke Association