



Hypertension with Acute Stroke

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The Case

- Mr MM 60 years old Accountant , just retired.
- He is known to be hypertensive since 7 years but on irregular medications , current smoker (15 cig/day) since 38 years.
- Not diabetic and no other important medical problems.
- He tested his serum lipids once since 5 years and his lipid profile was acceptable , so he did not receive any medications.

The Case

- He slept one day with tolerable headache to which he received analgesic at bed time.
- Next day in the morning his wife tried to awake him but he was snoring with no response.
- The ambulance transferred him to ER of a nearby hospital and was diagnosed as having acute cerebral stroke.

The Case

- In ER the patient was comatosed and flaccid .
- Pulse = 96 bpm.
- BP = 210/110 mmHg.
- Chest was clear.
- Heart audible S4 , no murmurs.
- ECG : voltage criteria of LVH.

- He was admitted to ICU.

Blood Pressure and Acute Stroke

- High-blood pressure is the leading modifiable risk factor for both ischaemic and haemorrhagic stroke.
- In acute stroke, 75% of patients have high BP and 50% of those have a prior history of hypertension.

Blood Pressure and Acute Stroke

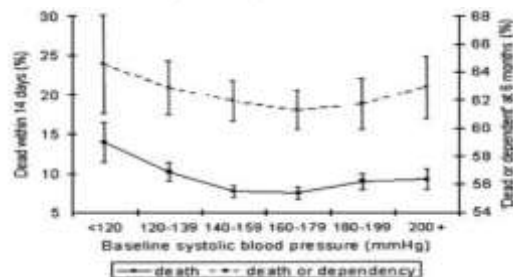
- Normal cerebral autoregulation, which maintains cerebral blood flow (CBF) despite fluctuations in cerebral perfusion pressure is **impaired** in acute stroke resulting in cerebral perfusion having a **linear relationship** with MAP.
- Rapid, large falls in BP could reduce CBF leading to extension of cerebral infarction, or perihæmatomal ischaemia.

Blood Pressure and Acute Stroke

- The debate surrounding whether high BP should or should not be treated in the context of acute stroke started over 30 years ago and despite large clinical trials the answer remains largely unclear.
- Type of stroke is the most important consideration for blood pressure management in the acute phase of stroke.
- In a majority of patients, a decline in BP occurs within the first hours after stroke even without any specific medical intervention.

Blood Pressure and Clinical Outcomes in the International Stroke Trial

Jo Leonardi-Bee, MSc; Philip M.W. Bath, FRCP; Stephen J. Phillips, FRCP; Peter A.G. Sandercock, FRCP; for the IST Collaborative Group



In summary, both high blood pressure and low blood pressure were associated with poor outcome after acute ischemic stroke in this cohort. The risks of early recurrent stroke and death resulting from presumed cerebral edema but not symptomatic intracranial hemorrhage were increased with high blood pressure. Low blood pressure was associated with early fatal coronary heart disease events.

Stroke May 2002

Types of Stroke

- Acute Ischemic Stroke
 - Eligible to tPA
 - Not eligible to tPA
- Intracerebral Hemorrhage

BP during acute ischemic stroke eligible for alteplase

- Earlier thrombolytic treatment of patients with AIS is not only associated with more frequent independent ambulation at discharge , but is also associated with reduced mortality and symptomatic intracerebral hemorrhage.
- One factor that has been associated with delays in treatment times is the need for prethrombolytic BP goal of < 185/110 mm Hg a target extrapolated from prior studies of thrombolysis in acute myocardial infarction.

BP during acute ischemic stroke eligible for alteplase

Recommendations for the Management of Ischemic Stroke With IV tPA

- IV tPA is recommended for selected patients who may be treated <3 hours after onset of ischemic stroke (Class I; Level of Evidence A).
- In patients eligible for IV tPA therapy benefit is time-dependent and treatment should be initiated as quickly as possible; the door-to-needle time should be <60 minutes from hospital arrival (Class I; Level of Evidence A).
- IV tPA is recommended for eligible patients who can be treated 3 to 4.5 hours after stroke onset (Class I; Level of Evidence B).
- IV tPA is reasonable in patients whose BP can be lowered safely to below 185/110 mm Hg with antihypertensive agents with the physician assessing the stability of the blood pressure before starting IV tPA.

Jauch EC, et al. *Stroke*. 2013;44:870-947.

BP during acute ischemic stroke eligible for alteplase

- In cases where such a target is not achieved, tPA may even be withheld leading to poor clinical outcomes.
- Withholding tPA based solely on persistently uncontrolled BP can lead to as many as 10% of eligible patients not receiving tPA within 4.5 hours.
- Thus, a proficient attempt must be made to reduce BP to the thrombolytic range, even if it involves using multiple BP agents or continuous infusions.

When thrombolysis is not an option

Contraindications to the Use of tPA

Another stroke or serious head trauma within preceding 3 months	Arterial puncture at a non-compressible site within the previous 7 days
Major surgery within 14 days	Seizure at the onset of stroke
History of intracranial hemorrhage, AVM or aneurysm	Anticoagulants within 48 hours prior to onset of stroke or elevated aPTT or PT >15 sec (INR >1.7) OR any direct IIa inhibitor or direct Xa inhibitor with abnormal sensitive laboratory tests/assays or last dose was <2 days. (ASA 2013 guidelines)
SBP >185 mmHg or DBP >110 mmHg	Platelet count <100,000 mm ³
Rapidly improving symptoms or minor symptoms	Glucose <50 mg/dL
Symptoms suggestive of subarachnoid hemorrhage	Intracranial or intraspinal surgery within 3 months
GI bleed or urinary tract hemorrhage within previous 21 days	Lumbar puncture within the previous 7 days
Additional Exclusion Criteria if within 3-4.5 hours of onset	
Age >80 years	NIHSS score >25 (severe stroke)
Current Anticoagulant Use	History of both stroke and diabetes

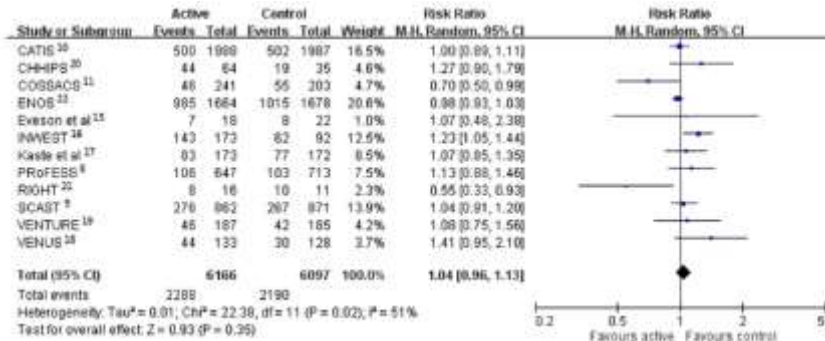
Jauch EC, et al. *Stroke*. 2013;44:870-947.

When thrombolysis is not an option

- Uncertainty surrounding the optimal management of **BP** in the acute setting.
- Must take into consideration the potential of **compromising collateral blood flow** **vs** the potential for adverse systemic effects as a result of **persistently elevated BP**.

Effect of Blood Pressure Lowering in Early Ischemic Stroke Meta-Analysis

Meng Lee, MD; Bruce Ovbiagele, MD, MS; Keun-Sik Hong, MD; Yi-Ling Wu, MS;
Jing-Er Lee, MD, PhD; Neal M. Rao, MD; Wayne Feng, MD; Jeffrey L. Saver, MD



In conclusion, this meta-analysis of completed clinical trials suggested blood pressure lowering in early ischemic stroke had a neutral effect on the prevention of death or dependency.

Stroke. 2015;46:1883-1889

Effect of BP on ICH

- ICH is a medical emergency.
- Rapid diagnosis and attentive management is crucial, because early deterioration is common in the first few hours.
- More than 20% of patients will experience a decrease in the Glasgow Coma Scale (GCS) of 2 or more points between the prehospital emergency medical services (EMS) assessment and the initial evaluation in the emergency department (ED).
- Among patients undergoing head CT within 3 hours of ICH onset, 28% to 38% have hematoma expansion of greater than one third of the initial hematoma volume on follow-up CT.

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Rapid Blood-Pressure Lowering in Patients with Acute Intracerebral Hemorrhage

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CONCLUSIONS

In patients with intracerebral hemorrhage, intensive lowering of blood pressure did not result in a significant reduction in the rate of the primary outcome of death or severe disability. An ordinal analysis of modified Rankin scores indicated improved functional outcomes with intensive lowering of blood pressure.

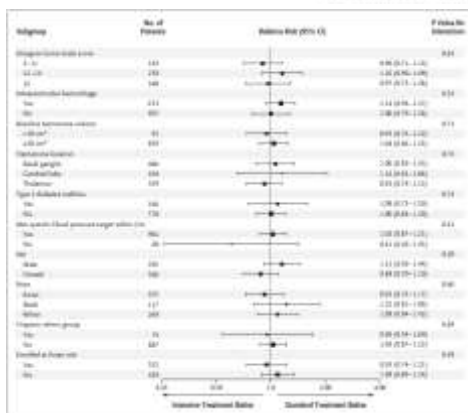


THE NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Intensive Blood-Pressure Lowering in Patients with Acute Cerebral Hemorrhage

Adnan I. Qureshi, M.D., Yuko Y. Palesch, Ph.D., William G. Barsari, M.D., Daniel F. Hanley, M.D., Chung Y. Hsu, M.D., Renee L. Martin, Ph.D., Claudia S. Moy, Ph.D., Robert Silbergleit, M.D., Thorsten Steiner, M.D., Jose I. Suarez, M.D., Kazunori Toyoda, M.D., Ph.D., Yongjun Wang, M.D., Haruko Yamamoto, M.D., Ph.D., and Byung-Woo Yoon, M.D., Ph.D., for the ATACH-2 Trial Investigators and the Neurological Emergency Treatment Trials Network*



In conclusion, our results do not support the notion that acute reduction to a target systolic blood pressure of 110 to 139 mm Hg in patients with intracerebral hemorrhage is more effective in improving functional outcome than a reduction to a target systolic blood pressure of 140 to 179 mm Hg.

N Engl J Med 2016;375:1033-43.

Guidelines

Hypertension Canada's 2017 Guidelines for Diagnosis, Risk Assessment, Prevention, and Treatment of Hypertension in Adults

2013 ESH/ESC Guidelines for the management of arterial hypertension

2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

VIII. Treatment of Hypertension in Association With Stroke Acute Stroke: Onset to 72 Hours

Acute
Ischemic
Stroke

Treat extreme BP elevation (systolic > 220 mmHg, diastolic > 120 mmHg) by 15-25% over the first 24 hour with gradual reduction after.
•If eligible for thrombolytic therapy treat very high BP (>185/110 mmHg)

Avoid excessive lowering of BP which can exacerbate ischemia

VIII. Treatment of Hypertension in Association With Stroke

Acute Stroke: Onset to 72 Hours

Strongly consider blood pressure reduction in all patients after the acute phase of stroke or TIA .



Combinations of an ACEI with an ARB are not recommended

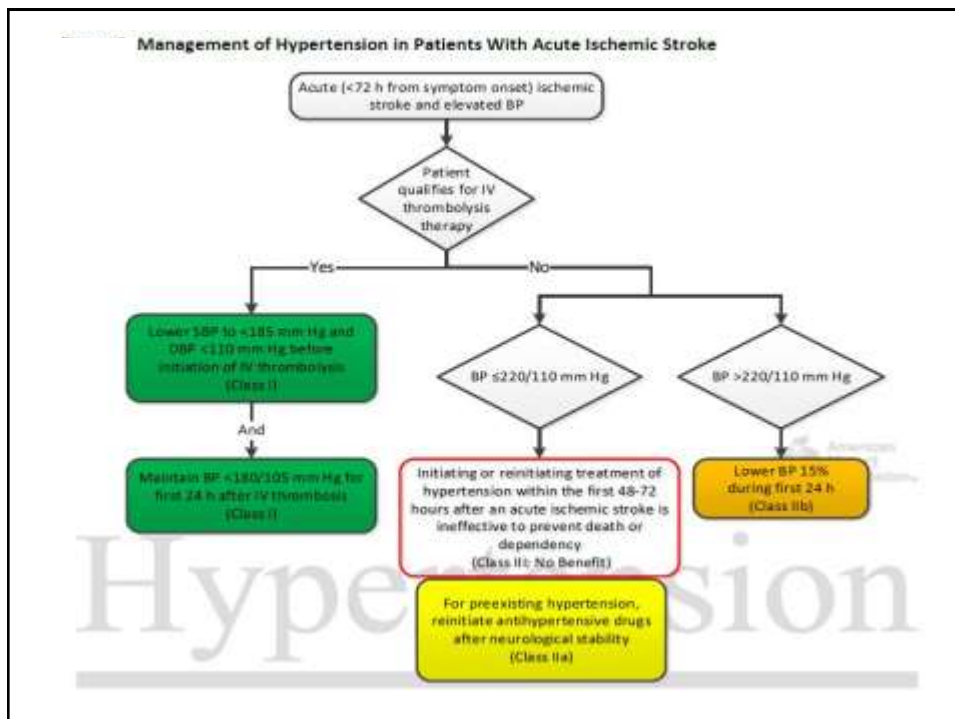
CHEP

Hypertension
CANADA

Therapeutic strategies in hypertensive patients with cerebrovascular disease

Recommendations	Class ^a	Level ^b	Ref. ^c
It is not recommended to intervene with BP-lowering therapy during <u>the first week</u> after acute stroke irrespective of BP level, although clinical judgement should be used in the face of very high SBP values.	III	B	544, 545
Antihypertensive treatment is recommended in hypertensive patients <u>with a history of stroke or TIA</u> , even when initial SBP is in the 140–159 mmHg range.	I	B	280, 296
In hypertensive patients with a history of stroke or TIA, a SBP goal of <u><140 mmHg</u> should be considered.	IIa	B	280, 296, 297
In elderly hypertensives with previous stroke or TIA, SBP values for intervention and goal may be considered to be <u>somewhat higher</u> .	IIb	B	141, 265
All drug regimens are recommended for stroke prevention, provided that BP is effectively reduced.	I	A	284

Recommendations for Management of Hypertension in Patients With Acute Ischemic Stroke		
References that support recommendations are summarized in Online Data Supplement 42.		
COR	LOE	Recommendations
I	B-NR	1. Adults with acute ischemic stroke and elevated BP who are eligible for treatment with intravenous tissue plasminogen activator should have their BP slowly lowered to <u>less than 185/110 mm Hg</u> before thrombolytic therapy is initiated (1, 2).
I	B-NR	2. In adults with an acute ischemic stroke, BP should be less than 185/110 mm Hg before administration of intravenous tissue plasminogen activator and should be maintained below 180/105 mm Hg for at least the first 24 hours after initiating drug therapy (3).
Ia	B-NR	3. Starting or restarting antihypertensive therapy during hospitalization in patients with BP greater than 140/90 mm Hg who are neurologically stable is <u>safe and reasonable</u> to improve long-term BP control, unless contraindicated (4, 5).
Ib	C-EO	4. In patients with BP of 220/120 mm Hg or higher who did not receive intravenous alteplase or endovascular treatment and have no comorbid conditions requiring acute antihypertensive treatment, the benefit of initiating or reinitiating treatment of hypertension within the <u>first 48 to 72 hours</u> is uncertain. It might be reasonable to <u>lower BP by 15%</u> during the first 24 hours after onset of stroke.
III: No Benefit	A	5. In patients with BP less than 220/120 mm Hg who did not receive intravenous thrombolysis or endovascular treatment and do not have a comorbid condition requiring acute antihypertensive treatment, initiating or reinitiating treatment of hypertension within the first 48 to 72 hours after an acute ischemic stroke is <u>not effective</u> to prevent death or dependency (4-9).



Intravenous Antihypertensive Drugs for Treatment of Hypertensive Emergencies

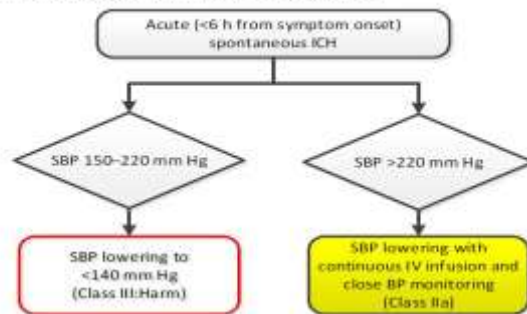
Drug	Bolus Dose	Continuous Infusion Rate
Labetalol	5–20 mg every 15 min	2 mg/min (maximum 300 mg/d)
Nicardipine	NA	5–15 mg/h
Esmolol	250 µg/kg IV push loading dose	25–300 µg/kg/min
Enalapril	1.25–5 mg IV push every 6 h*	NA
Hydralazine	5–20 mg IV push every 30 min	1.5–5 µg/kg/min
Nipride	NA	0.1–10 µg/kg/min
Nitroglycerin	NA	20–400 µg/min

Recommendations for Management of Hypertension in Patients With Acute Intracerebral Hemorrhage (ICH)

References that support recommendations are summarized in Online Data Supplement 41.

COR	LOE	Recommendations
IIa	C-EO	1. In adults with ICH who present with SBP greater than 220 mm Hg, it is reasonable to use <u>continuous intravenous drug infusion</u> (Table 19) and close BP monitoring to lower SBP.
III: Harm	A	2. Immediate lowering of SBP (Table 19) to less than 140 mm Hg in adults with spontaneous ICH who present within 6 hours of the acute event and have an SBP between 150 mm Hg and 220 mm Hg <u>is not of benefit</u> to reduce death or severe disability and can be potentially harmful (1, 2).

Management of Hypertension in Patients With Acute ICH



The Case

- BP 210/110 mmHg.
- Acute Ischemic Stroke.
- Not candidate for thrombolysis.
- Known hypertensive.
- BP after 72 hours 174/98 mmHg.
- Neurologically stable after 72 hours.
- So started antihypertensive drug combination aiming to reach BP target <140/90 mmHg.

