

Targeted approach to pressure in intracerebral hemorrhage (TAP-ICH)

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Study Objective

To Examine the prescribed SBP targets in patients in the intensive care unit (ICU) at Victoria General Hospital (VGH) following ICH, how quickly and effectively these targets are being met, and the clinical outcomes of these patients.

Outcome Measures

Primary outcome:

- Time under target SBP

Secondary outcomes:

- SBP target prescribed
- SBP achieved
- SBP variability
- SBP magnitude
- Time until SBP is under target
- Description of doses and frequency of antihypertensives used

Outcome Measures

SBP achieved:

- Mean SBP over first 24 hours of therapy

SBP variability:

- Standard deviation of SBP achieved

SBP magnitude:

- Absolute difference between highest and lowest recorded SBP

*Larger values associated with worse clinical outcomes in previous trials

Outcome Measures

Clinical outcomes:

- mRS at day 7, day 28, and discharge
- mortality
- hospital and ICU LOS
- large hematoma expansion ($\geq 33\%$)

Safety outcomes:

- SCr increases of 1.5x baseline
- use of fluid boluses and/or vasopressors for hypotension

Methods

Table 1: Inclusion and Exclusion Criteria

Inclusion Criteria:

- Patients 18 years of age and older
- Admission to ICU at VGH between May 2016 and September 2019
- Non-traumatic intracerebral bleeding as admission diagnosis

Exclusion Criteria:

- GCS of 5 or less on presentation to the emergency department (ED)
- No target SBP ordered within 6 hours from presentation to the ED
- Contraindication to BP lowering (e.g. severe renal failure or severe cerebral artery stenosis)
- Ischemic stroke within past 30 days of ICH
- Clear documentation that patient information should not be used in research

Statistical Analysis: Primary and secondary outcomes expressed using descriptive analysis and 95% CIs. Secondary outcomes with non-normally distributed data are expressed as median values opposed to means.

Results

73 patients identified via provincial critical care database

25 patients excluded:

- 8 patients with GCS < 5
- 7 patients with no SBP target within 6 hours of presentation
- 3 patients with ischemic stroke within 30 days of ICH
- 4 patients wrongly labelled as having ICH as diagnosis for ICU encounter
- 3 patients managed at different sites, no information available on initial management

48 patients included

Results

Table 2: Baseline Characteristics

	Mean	Range
SBP at Presentation (mmHg)	180.5	(116-267)
Age (years)	61.3	(19-84)
	(%)	(n/N)
Female	50.0	(24/48)
Antihypertensive use	39.6	(19/48)
Hypertension	60.4	(29/48)
Antiplatelet Use	22.9	(11/48)
Anticoagulant Use	16.7	(8/48)
Antiplatelet and Anticoagulant Use	10.4	(5/48)
Previous Ischemic Stroke	18.8	(9/48)
Previous ICH	4.2	(2/48)
SBP over 220 mmHg	10.4	(5/48)
Intraventricular Extension	47.9	(23/48)
Surgical Management	31.3	(15/48)
	Median	Range
Hematoma Size (cm ³)	61.5	(0.9-283.6)
Weight (kg)	75.8	(35.5-141)
Glasgow Coma Scale at Presentation	13	(6-15)

Results

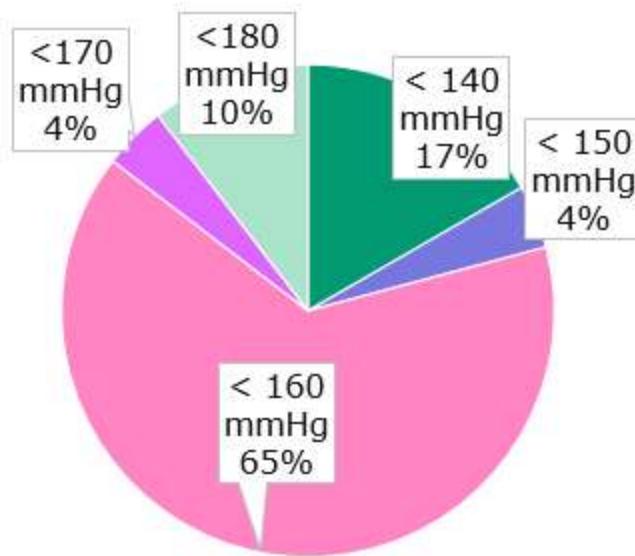


Figure 2: Proportions of prescribed SBP targets (n=48)

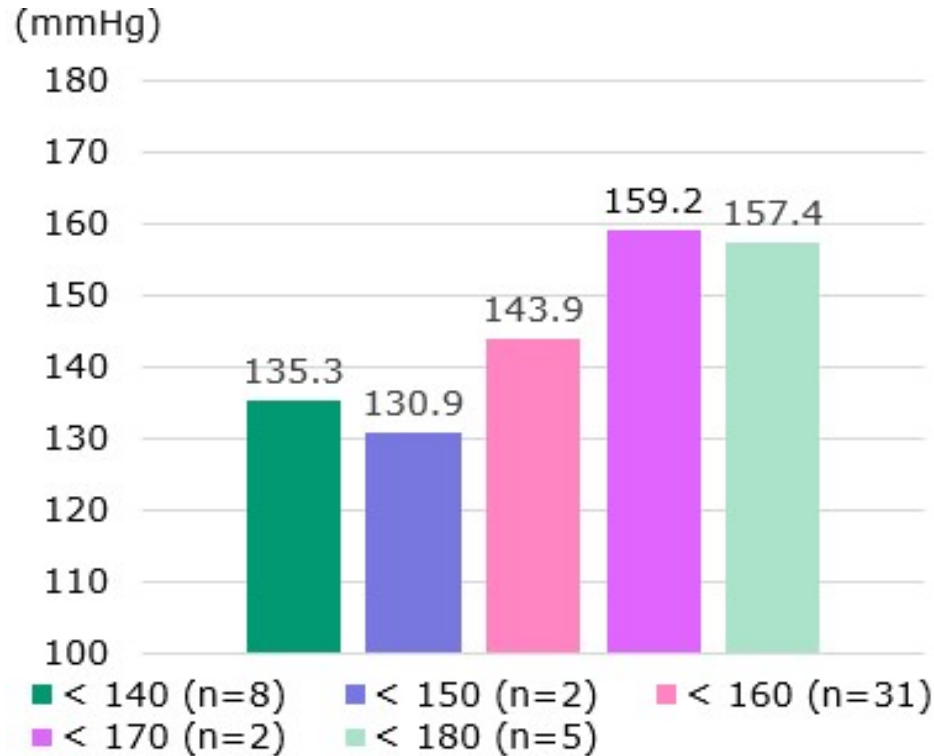
Primary Outcome

Mean percentage of time below SBP target:
75.3%
(18.1 h \pm 1.3 h)

Secondary Outcomes

Median time to reach SBP target:
40 min
(53.1% < 60 min,
78.7% < 120 min)

Results



**Mean SBP
achieved across all
SBP target groups:
144 mmHg**

Figure 3: mean SBP achieved for different SBP targets (mmHg)

Results

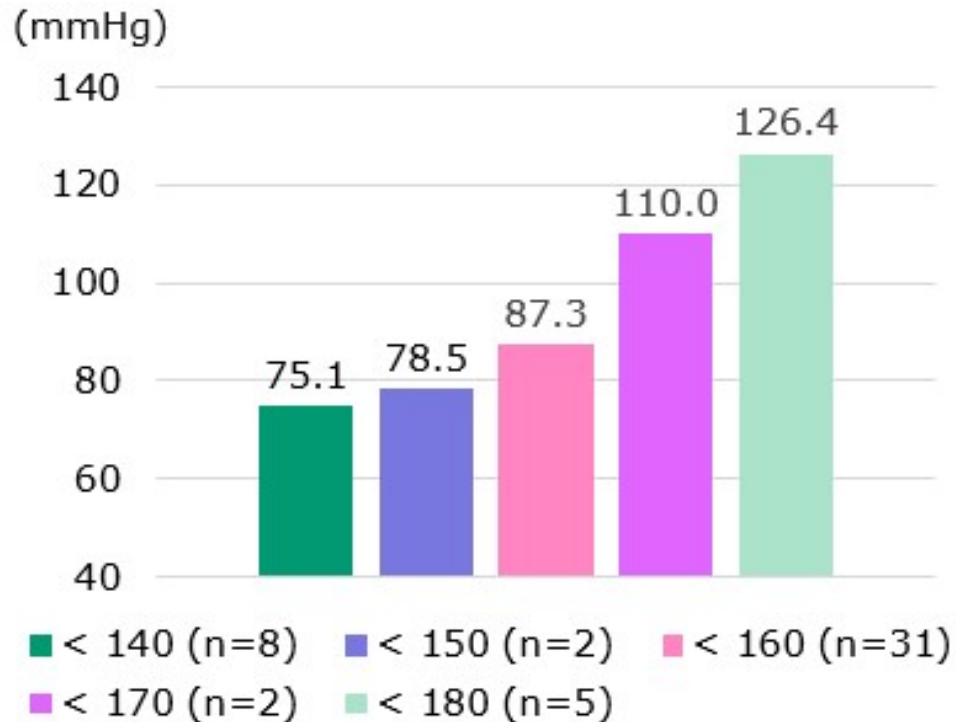
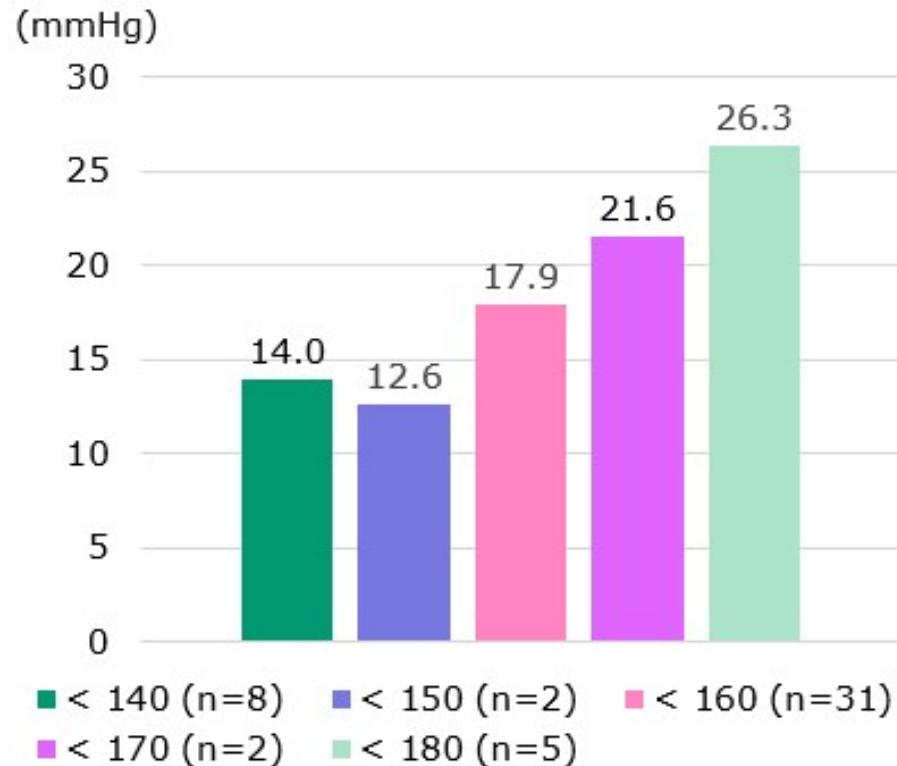


Figure 5: mean SBP magnitude for different SBP targets (mmHg)

Mean SBP magnitude across all SBP target groups: 90 mmHg

Results



**Mean SBP
variability across
all SBP target
groups:
18 mmHg**

*Figure 4: mean SBP variability
for different SBP targets (mmHg)*

Results

Clinical Outcomes		
	(%)	no.
<u>mRS 0-2</u>		
a) at Day 7	4.2%	(2/48)
b) at Day 28	6.2%	(3/48)
c) at Discharge	12.5%	(6/48)
<u>mRS 3-5</u>		
a) at Day 7	75.0%	(36/48)
b) at Day 28	54.2%	(26/48)
c) at Discharge	43.8%	(21/48)
Mortality	43.8%	(21/48)
Large Hematoma expansion	18.6%	(9/48)
	Median Range	
Median Hospital LOS for Surviving Patients (days)	32	(9-155)
Median ICU LOS for Surviving Patients (days)	3	(1-12)

Results

Safety Outcomes			
SBP Target	Fluid bolus given	Vasopressor use	Sig. SCr rise
< 140 mmHg (n=8)	12.5%	0%	0%
< 150 mmHg (n=2)	50%	50%	0%
< 160 mmHg (n=31)	35.5%	32.3%	6.5%
< 170 mmHg (n=2)	0%	0%	0%
< 180 mmHg (n=5)	40%	20%	0%
Total (n=48)	31.2%	25%	4.2%

Results

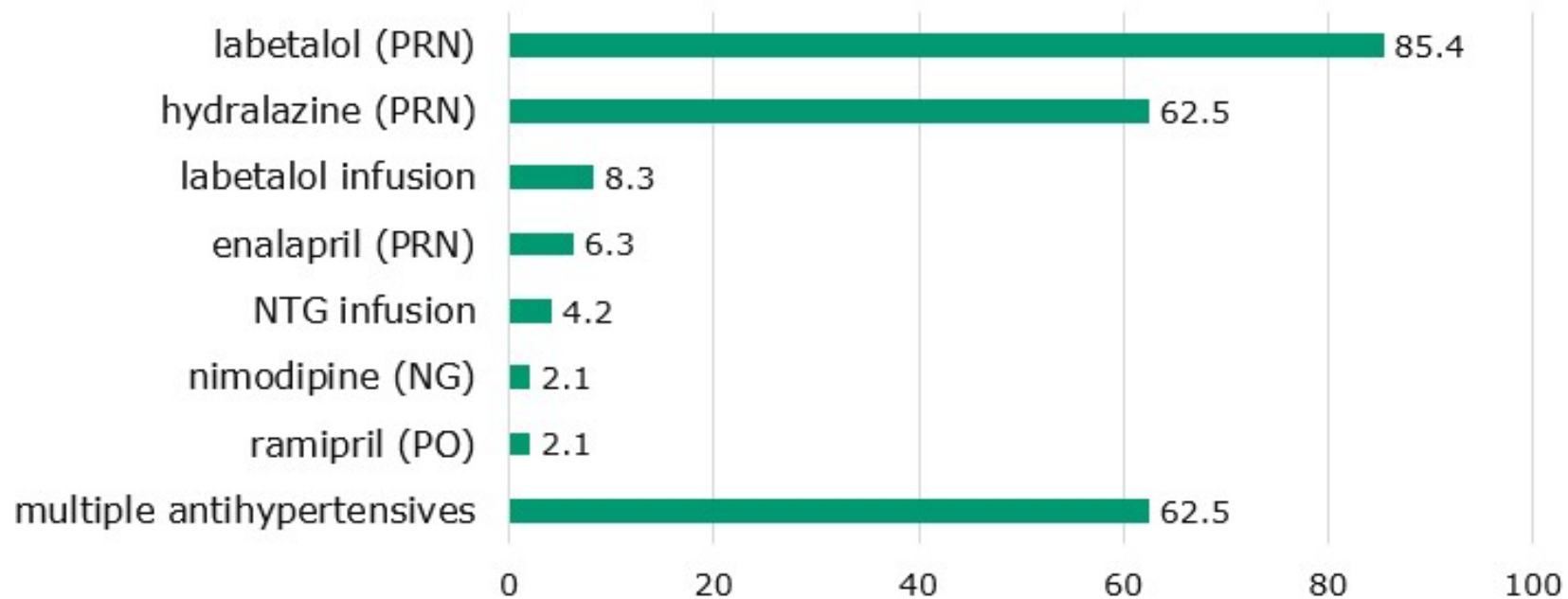


Figure 6: Percent of patients receiving different antihypertensive agents in first 24 hours of treatment (administered intravenously unless otherwise specified)

Results

	Observed Labetalol Dosing in Study (Median Values)	Recommended Maximum Dosing of Labetalol^{7,8}
Intermittent IV dosing for hypertension following ICH	10 mg/dose	80 mg/dose
	0.125 mg/kg/dose	0.25 mg/kg/dose
	60 mg/day	300 mg/day

Mean number of antihypertensive doses received per patient was: **8.2 doses/24 h** (95% CI 6.5-9.9 doses)

Figure 7: Observed dosing of labetalol in study compared to recommended maximum PRN IV dosing

Discussion

Study Strengths

- Comprehensive review of ICH management specific to Island Health
- Can help inform future management of ICH patients at VGH

Limitations

- Small study population (no statistically significant trends detected)
- Heterogeneous patient population (some patients did not have elevated SBP)
- Difference in definitions of magnitude, variability, other study methodology compared to previous landmark trials

Discussion

Blood pressure control methods appear effective

- Patients remained under SBP target 75% of the time on average using:
 - Sub-maximal labetalol doses, multiple antihypertensives, more than 8 doses in first 24 hours
- 53% of patients reached target SBP within first hour, 100% within 6 hours
- Mean SBP achieved was below target for each SBP target group
- 1/8 patients were discharged independent and with minor to no disability

Discussion

Blood Pressure control methods may be too aggressive

- Survival rate was 56%
 - National average survival appears to be above 60%
- Large number of patients required intervention for hypotension
 - 35% of patients received either fluid boluses or pressors
 - Low number of symptomatic hypotension in previous trials
- SBP targets, time under targets, or any other secondary outcomes did not correlate with differences in clinical or safety outcomes

Discussion

Management of blood pressure after ICH is variable

- 5 different SBP targets identified (< 160 mmHg was most common)
- Larger SBP variability and magnitude observed with higher SBP targets
- Prescribing of non-recommended antihypertensive agents identified in very small number of cases (nimodipine, nitroglycerin used in 3 cases)

Now What?

Are these results important or significant?

How can we apply these results to help improve outcomes for patients at VGH?

Thank you

Any other questions?

