Management of Hypertension for Stroke Prevention in New Zealand: Can We Do Better?

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Waitemata DHB
Increasing stroke numbers in New Zealand an 'epidemic' says leading AUT researcher

Tuesday 30 November 2010, 12:23PM
By AUT University
182 views

NORTH SHORE CITY
Urgent measures are needed to reduce the growing number of stroke victims in New Zealand, says Professor Valery Feigin, Director of the new National Institute for Stroke and Applied Neuroscience, which is officially being launched today by Associate Minister of Health, the Hon Dr Jonathan Coleman at AUT’s North Shore Campus.

Currently costing the country over $450 million per year in hospital and rehabilitation-related costs alone, stroke incidence in New Zealand is the second highest amongst developed countries and numbers are only increasing, says Feigin.
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Differences in cardiovascular mortality between Australia and New Zealand according to socioeconomic status: findings from the Long-Term Intervention with Pravastatin in Ischaemic Disease (LIPID) Study

Ralph A H Stewart, Fiona M North, Katrina J Sharples, R John Simes, Andrew M Tonkin, Harvey D White; for the Long-term Intervention with Pravastatin in Ischaemic Disease (LIPID) Study Investigators

Abstract

Background Cardiovascular mortality is higher in New Zealand compared to Australia, but reasons for this difference are uncertain. This study describes differences in cardiovascular risk factors and cardiovascular mortality in Australians and New Zealanders with stable coronary artery disease stratified by socioeconomic status.
Cerebrovascular circulation is the most blood pressure-sensitive “target organ” and up to 70% of all strokes are blood pressure-related
Blood Pressure and Risk of Stroke Mortality

Lancet 2002;360:1903-13
Impact of High-Normal Blood Pressure on Risk of Major Cardiovascular Events* in Men

Cumulative Incidence of Major Cardiovascular Events (%)

Blood Pressure:

High-Normal
130–139/85–89 mm Hg

Normal
120–129/80–84 mm Hg

Optimal
<120/80 mm Hg

*Defined as death due to cardiovascular disease or as having recognized myocardial infarction, stroke, or congestive heart failure.

## Classification of Blood Pressure

<table>
<thead>
<tr>
<th>Category</th>
<th>SBP</th>
<th>or</th>
<th>DBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 120</td>
<td>or</td>
<td>&lt; 80</td>
</tr>
<tr>
<td><strong>Prehypertension</strong></td>
<td>120-139</td>
<td>or</td>
<td>80-89</td>
</tr>
<tr>
<td>Stage 1</td>
<td>140-159</td>
<td>or</td>
<td>90-99</td>
</tr>
<tr>
<td>Stage 2</td>
<td>&gt; 160</td>
<td>or</td>
<td>&gt; 100</td>
</tr>
</tbody>
</table>
The VA Cooperative Study, 1967

<table>
<thead>
<tr>
<th>Cohort</th>
<th>143 men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>51 years</td>
</tr>
<tr>
<td>Eligibility</td>
<td>Diastolic BP 115-129 mmHg</td>
</tr>
<tr>
<td>Design</td>
<td>Double blind; placebo control</td>
</tr>
<tr>
<td>Therapy</td>
<td>HCTZ, reserpine, hydralazine</td>
</tr>
<tr>
<td>Duration</td>
<td>1.5 years</td>
</tr>
<tr>
<td>BP change</td>
<td>-43/30 mmHg</td>
</tr>
</tbody>
</table>

HCTZ = hydrochlorothiazide

Mean follow-up 18 months

<table>
<thead>
<tr>
<th></th>
<th>Placebo (70)</th>
<th>Active Treatment (73)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Class A events</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Other treatment failures</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Class B events</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Total events</td>
<td>27 (39%)</td>
<td>2 (3%)</td>
</tr>
</tbody>
</table>
Apart from the 1967 trial of treatment of individuals with severe hypertension, the majority of RCT’s of drug treatment in hypertension have involved individuals broadly within the “mild to moderate” category.

140-179/ 90-109
What do these RCT’s (total ~ 190 000 pts) of hypertension drug treatment show?

Major cardiovascular events (MI, stroke, heart failure) reduced by ave. 25%

**Stroke 40%** , MI 15-20%, CHF 50%

Relative risk reduction similar in all age groups

*Arch Int Med 1993;153:578*
*BMJ 2008;336:1121*
### The Systolic Hypertension in the Elderly Program, 1991

<table>
<thead>
<tr>
<th><strong>Cohort</strong></th>
<th>4,736; 43% men</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>≥ 60 yrs old; mean 71.6 yrs old</td>
</tr>
<tr>
<td><strong>Eligibility</strong></td>
<td>Systolic BP 160–219 mmHg and Diastolic BP &lt;90 mmHg</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>Double blind; placebo control</td>
</tr>
<tr>
<td><strong>Therapy</strong></td>
<td>Chlorthalidone (atenolol as step 2)</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>4.5 years</td>
</tr>
<tr>
<td><strong>BP change</strong></td>
<td>Systolic BP −12 mmHg</td>
</tr>
</tbody>
</table>

BP = blood pressure

SHEP
Change in Blood Pressure

**Systolic BP**

Placebo (n=2,371)

Active Rx (n=2,365)

**Diastolic BP**

Placebo (n=2,371)

Active Rx (n=2,365)

SHEP=Systolic Hypertension in the Elderly Program
Copyright ©1991, American Medical Association.

BP=blood pressure

Slide Source
Hypertension Online
www.hypertensiononline.org
SHEP
Cumulative Stroke Rate

Cumulative stroke rate
per 100 persons

Placebo
(n=2,371)

Active Rx
(n=2,365)

P=0.0003

Months of follow-up

0 12 24 36 48 60 72

SHEP = Systolic Hypertension in the Elderly Program
Copyright ©1991, American Medical Association.
Figure 2. Kaplan–Meier all-cause mortality survival curves for SHEP participants with incident stroke (n=262), TIA (n=122), or neither during the extended follow-up period.

(1) 65% of participants who suffered a stroke during original SHEP Trial (4.5 years) died during 14.3 year follow-up vs 40.6% of those who did not suffer stroke.

(2) 55% cardiovascular deaths
   - 32% non-stroke (principally CAD)
   - 23% stroke
Initial stroke even if minor is a marker of a serious systemic disease which carries a poor prognosis.

Patients with initial stroke more likely to die of non-stroke cardiovascular causes.

Prevention of initial stroke is important.

Treating global cardiovascular risk is important.
Treatment of Hypertension in Patients 80 years of Age or Older
(HYVET Study)

In this study, patients 80 years of age or older with sustained systolic hypertension were randomly assigned to receive either the diuretic indapamide, with or without the angiotensin-converting-enzyme inhibitor perindopril, or matching placebos, for a target blood pressure of 150/80 mm Hg.
1933 patients on active treatment and 1912 placebo

Mean age 83.6 years (both groups)

Mean seated BP 173/90 (both groups)

Mean BP reduction in treatment group 15/6.1

Followed for mean 4 years
Mean Blood Pressure, Measured while Patients Were Seated, in the Intention-to-Treat Population, According to Study Group

www.hypertensiononline.org


<table>
<thead>
<tr>
<th>Years</th>
<th>Placebo group</th>
<th>Active-treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1912</td>
<td>1933</td>
</tr>
<tr>
<td>1</td>
<td>1468</td>
<td>1540</td>
</tr>
<tr>
<td>2</td>
<td>701</td>
<td>754</td>
</tr>
<tr>
<td>3</td>
<td>330</td>
<td>373</td>
</tr>
<tr>
<td>4</td>
<td>191</td>
<td>207</td>
</tr>
<tr>
<td>5</td>
<td>116</td>
<td>118</td>
</tr>
</tbody>
</table>
Treatment Group had:

- 30% reduction in rate of fatal or non-fatal stroke
- 39% reduction in rate of death from stroke
- 21% reduction in rate of death from any cause
- 23% reduction in rate of death from cardiovascular causes
- 64% reduction in rate of heart failure
Before 2001 it was unclear whether BP treatment was effective for secondary prevention of stroke, but following publication of *Progress* (*Lancet* 2001;358:1033) and subsequent studies clear that it is.

Following a stroke or TIA there is a 33% reduction in recurrent stroke risk for each 10mmHg reduction in SBP (*J Clin Hypertens* 2011;13:693).
Stroke not just a problem of old people

Young men with unrecognised hypertension and metabolic syndrome particularly at risk
Prevalence of Hypertension in the United States by Age

*Based on data from the 1999–2000 National Health and Nutrition Examination Survey. Hypertension is defined as blood pressure \( \geq 140/90 \) mm Hg or as receiving antihypertensive treatment.

†Low reliability due to large relative error.

So why is stroke incidence in New Zealand unacceptably high?
High blood pressure is not effectively managed in New Zealand
(personal view)
Hypertension specialists retired or died from the 1980’s – 1990’s. Cardiologists deemed hypertension not to be an important specialty, shut down the hypertension clinics, and devolved hypertension management entirely to primary care.

Cardiologists and other medical specialists lost hypertension management skills.

No-one left to educate medical students, trainee physicians and GP’s.

GP’s don’t know how to treat simple or complex hypertension and have nowhere to refer their difficult patients.
We are not interested in prevention

Public awareness BP health risk - All time Low

99% of resource - High tech treatments and complications

- Coronary angiography and intervention
- Cardiac surgery
- Stroke units and rehab ($450 million per year inpatient costs)
- Heart failure clinics
No financial incentives for GP’s to manage blood pressure effectively
Because no-one in the Pharmac corridors of power is interested in hypertension our patients are missing out on badly needed modern (and some old) antihypertensive drug therapies

Reserpine  
Aldactazide  
Amiloride  
Minoxidil  
Moxonidine  
Eplerenone  
Aliskerin

Combinations containing chlorthalidone rather than HCTZ  
Modern fixed-dose combinations  
  • ACE-inhibitor – CCB  
  • ARB-CCB  
  • ACE-inhibitor – CCB – thiazide  
  • ARB – CCB – thiazide
Hypertension Clinic Patients

Mean age 57 (range: 19 – 89)

**BP**: avg 155/86 at presentation; 131/75 avg at discharge 74% achieved target blood pressure

Average number of visits: 3.5
New Zealand Cardiovascular Guidelines Handbook

2009 Edition

Cardiovascular risk assessment and diabetes screening
- Cardiovascular risk factor management
  - Smoking cessation
  - Atrial fibrillation
  - Coronary heart disease
  - Stroke and transient ischaemic attack
  - Rheumatic fever
  - Prevention of infective endocarditis
  - Heart failure
New Zealand Cardiovascular Risk Calculator
Assessing cardiovascular risk and treatment benefit

Cells with this marker (★) indicate patients with either a very high total cholesterol or very high blood pressure. In these patients the tables may underestimate true risk.

<table>
<thead>
<tr>
<th>Absolute 5-year CV risk (total and non-total)</th>
<th>Risk level 5-year CV risk (total and non-total)</th>
<th>Benefits: NNT* for 5 years to prevent one eventb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high &gt; 30%</td>
<td>Total intervention 13 (20% risk reduction)</td>
<td>1 Intervention (20% risk reduction)</td>
</tr>
<tr>
<td>25-30%</td>
<td>7 (14 per 100)</td>
<td>2 Interventions (42% risk reduction)</td>
</tr>
<tr>
<td>20-25%</td>
<td>11 (5 per 100)</td>
<td>3 Interventions (55% risk reduction)</td>
</tr>
<tr>
<td>15-20%</td>
<td>15 (7 per 100)</td>
<td></td>
</tr>
<tr>
<td>Moderate 10-15%</td>
<td>20 (5 per 100)</td>
<td></td>
</tr>
<tr>
<td>5-10%</td>
<td>11 (9 per 100)</td>
<td></td>
</tr>
<tr>
<td>Mild 2.5-5%</td>
<td>10 (2.5 per 100)</td>
<td></td>
</tr>
<tr>
<td>&lt; 2.5%</td>
<td>9 (11 per 100)</td>
<td></td>
</tr>
</tbody>
</table>

* Number needed to treat

b Based on the conservative estimate that each intervention: aspirin, blood pressure treatment (↓ SBP by 10 mmHg) or lipid modification (↓ LDL-cholesterol by 20%) reduces CV risk by approximately 25% over 5 years.
Basis for this is that active (pharmacological) treatment is suggested if 5 year risk of cardiovascular event is > 15%

But

“Isolated single risk factors” do not mandate therapy unless extremely abnormal (BP > 170/100, total cholesterol > 8mmol/l etc)
50 year old European female

- BP averages 160/95 on multiple readings
- BMI 25
- TC 6.1mmol/l, HDL 1.2mmol/l
- Non-smoker, non-diabetic
50 year old European female

- BP averages 160/95 on multiple readings
- BMI 25
- TC 6.1, HDL 1.2
- Non-smoker, non-diabetic

5 year risk 5-10%: therefore

No antihypertensives
No statin
“Old Men Making Rules to Treat Themselves”
## CV Risk Factor Estimation Systems

<table>
<thead>
<tr>
<th>System</th>
<th>Geographic Area</th>
<th>Age (yrs)</th>
<th>Time Horizon (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framingham</td>
<td>US</td>
<td>35-75</td>
<td>10</td>
</tr>
<tr>
<td>Score</td>
<td>Europe</td>
<td>40-65</td>
<td>10</td>
</tr>
<tr>
<td>Assign</td>
<td>Scotland</td>
<td>30-74</td>
<td>10</td>
</tr>
<tr>
<td>Q Risk</td>
<td>General Practice</td>
<td>35-74</td>
<td>10</td>
</tr>
<tr>
<td>Procam</td>
<td>Europe</td>
<td>20-75</td>
<td>10</td>
</tr>
<tr>
<td>WHO/ISH</td>
<td></td>
<td>40-79</td>
<td>10</td>
</tr>
<tr>
<td>Reynolds</td>
<td>WHS-PHS2</td>
<td>45-80</td>
<td>10</td>
</tr>
<tr>
<td><strong>NZ CV Risk Guideline</strong></td>
<td><strong>New Zealand</strong></td>
<td><strong>35-75</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

Short term cardiovascular risk
  - low < 10% 10 year
  - high >= 10% 10 years or diagnosed diabetes

Long term cardiovascular risk
  - low < 39% lifetime
  - high >= 39% lifetime

Population divided in to 3 groups
  - low short term/ low long term (26%)
  - low short term/ high long term (56%)
  - high short term/ high long term (18%)
For example

50 year old female
- BP 160/95
- TC 6.1, HDL 1.2
- Non-smoker, non-diabetic
NZ Risk Score 5-10% 5years – no treatment
Lifetime cardiovascular risk – 50%

50 year old female
- BP 115/75
- TC 4, HDL 1.5
- Non-smoker, non-diabetic
NZ Risk Score <2.5% - no treatment
Lifetime cardiovascular risk – 8%
If we had the means to reduce the risk of breast cancer in women at high lifetime risk by 42% - would we employ it?

Causes of death in NZ women

- cardiovascular disease 40%
- breast cancer 5%
Waitemata Hypertension Clinic Risk Factor Management Guideline

• No smoking at any time

• Fasting blood glucose < 5.5mmol/l

• Antihypertensive drug treatment of all (irrespective of age, gender, smoking or lipid status) with sustained BP >= 140/90, and >=130/80 for diabetes, CKD, or history of MI, stroke or PVD

• Statins for all (irrespective of age, gender, BP or smoking status) with LDL-C > 2.5mmol/l +/- TC/HDLC ratio > 4, and irrespective of lipid profile in diabetics, CKD or history of MI, stroke or PVD

• Low dose aspirin in all over 50 on treatment for hypertension or dyslipidaemia, and irrespective of age in all individuals with a history of MI, stroke, or PVD
Hypertension as a Public Health Risk

2011 Canadian Hypertension Education Program Recommendations
Summary

Blood pressure elevation is associated with up to 70% of stroke

Most of the excess risk associated with hypertension can be prevented by treating blood pressure to target

Stroke rates are unacceptably high in New Zealand (in my view) because of widespread poor management of hypertension

Hypertension is poorly managed in NZ because of

- Poor public health awareness (government)
- Lack of specialist referral services (government and DHB’s)
- Underskilled and unincentivised GP’s
- Lack of clinical leadership (primary and secondary care)
- Outdated and ambiguous advice in the NZ Cardiovascular Guideline