Improving the Care of the Hypertensive Patient: US Perspective

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DISCLOSURE OF RELATIONSHIPS

For William C. Cushman, MD Over the Past 12 Months

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Speakers Bureau: none

Major stock shareholder: none

Other Support, Tangible or intangible: none
70 million Americans

Increase in prevalence of HTN from 1988 to 1999; No significant increase between 1999 and 2004.

From Bernard Cheung Ong, et al, Hypertension 2007

From Bernard Cheung Ong, et al, Hypertension 2007
Prevalence of Hypertension in U.S. by Race/Ethnicity: 1988-2004

From Bernard Cheung Ong, et al, Hypertension 2007
Awareness, Treatment and Control in Adults Ages 18-74 Yrs with Hypertension in US NHANES 1976-2000

Awareness, Treatment and Control in (All) Adults with Hypertension in US NHANES 1999-2004

<table>
<thead>
<tr>
<th>Year</th>
<th>Awareness</th>
<th>Treatment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>69</td>
<td>58</td>
<td>29</td>
</tr>
<tr>
<td>2001-2002</td>
<td>71</td>
<td>60</td>
<td>33</td>
</tr>
<tr>
<td>2003-2004</td>
<td>76*</td>
<td>65</td>
<td>37*</td>
</tr>
</tbody>
</table>

Not adjusted for age.
*P<0.05 compared to 1999-2000.

From Bernard Cheung Ong, et al, Hypertension 2007
NHANES 1999-2004
Conclusions


• From 1999 to 2004: BP control in HTN ↑ (to 37%).
• Improvement in BP control observed in both sexes, in non-Hispanic black and Mexican Americans.

• In the young, awareness and treatment rates are low, but BP is easy to control.

• In the elderly, awareness and treatment rates are high, but BP targets are less easily reached.

From Bernard Cheung Ong, et al, Hypertension 2007
# Lifestyle Modification for Prevention in PreHTN and Treatment in HTN

<table>
<thead>
<tr>
<th>Modification</th>
<th>Approximate SBP reduction (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight reduction</td>
<td>5-20 mmHg / 10 kg weight loss</td>
</tr>
<tr>
<td>Adopt DASH eating plan</td>
<td>8-14 mmHg</td>
</tr>
<tr>
<td>Dietary sodium reduction</td>
<td>2-8 mmHg</td>
</tr>
<tr>
<td>Physical activity</td>
<td>4-9 mmHg</td>
</tr>
<tr>
<td>Moderation of alcohol consumption</td>
<td>2-4 mmHg</td>
</tr>
</tbody>
</table>

JNC 7. JAMA. 2003; 289:2560f
ALLHAT Hypertension Trial

42,418 high-risk hypertensive patients
90% previously treated
10% untreated

<table>
<thead>
<tr>
<th>STEP 1 AGENTS (Double-blind)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorthalidone 12.5-25 mg</td>
</tr>
<tr>
<td>Amlodipine 2.5-10 mg</td>
</tr>
<tr>
<td>Lisinopril 10-40 mg</td>
</tr>
<tr>
<td>Doxazosin 1-8 mg</td>
</tr>
<tr>
<td>N=15,255</td>
</tr>
<tr>
<td>N=9,048</td>
</tr>
<tr>
<td>N=9,054</td>
</tr>
<tr>
<td>N=9,061</td>
</tr>
</tbody>
</table>

Blinded drugs titrated and atenolol, clonidine, reserpine, and/or hydralazine added as needed to achieve BP goal:
<140/90 mm Hg

JAMA 2002;288:2981-2997
ALLHAT

Blood Pressure Control

2.0 = mean number of drugs

- DBP<90
- SBP<140
- BP<140/90

ALLHAT
Cumulative Percent Controlled (BP <140/90 mm Hg) at Five Years

Derived from Cushman et al. J Clin Hypertens. 2002;4:393-404
Inadequate Management of BP in a VA Hypertensive Population

- 800 hypertensive men @ 5 VAs in New England over a 2 yr period in early 1990s.
- >6 HTN-related MD visits/yr; ave age: 65.5 years.
- BP control:
  - 40% had BP $\geq 160/90$ mm Hg
  - <25% had BP $< 140/90$ mm Hg
  - Increases in therapy: only 6.7% of visits.
- More intensive Tx lead to better control of BP ($p<.01$).
- “Many physicians are not aggressive enough in their approach to hypertension.”

BP control rates were made a performance measure: audited by Office of Quality Performance (OQP) as part of the External Peer Review Program (EPRP).

Electronic medical record system VA-wide since 1997-98.

Clinical reminder in electronic medical record if BP above goal.

VA HTN Field Advisory Committee conducted a series of national teleconferences: ALLHAT, JNC 7, VA-DoD HTN guidelines, BP and thiazide diuretic performance measures, et al.
Outpatient hypertension treatment, treatment intensification, and control in Western Europe and the United States

Cross-sectional analyses of the nationally representative CardioMonitor 2004 survey: 291 cardiologist and 1284 PCPs (n=21,053 hypertensive patients)

JNC 7 Algorithm for Treatment of Hypertension

Lifestyle Modifications

Not at Goal Blood Pressure (<140/90 mmHg)
(<130/80 mmHg for those with diabetes or chronic kidney disease)

Initial Drug Choices

With Compelling Indications

Drug(s) for the compelling indications
Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.

Without Compelling Indications

Stage 1 Hypertension
(SBP 140–159 or DBP 90–99 mmHg)
Thiazide-type diuretics for most.
May consider ACEI, ARB, BB, CCB, or combination.

Stage 2 Hypertension
(SBP ≥160 or DBP ≥100 mmHg)
2-drug combination for most (usually thiazide-type diuretic and
ACEI, or ARB, or BB, or CCB)

Optimize dosages or add additional drugs until goal blood pressure is achieved.
Consider consultation with hypertension specialist.
Recommendation for Initial Antihypertensive Drug Therapy in JNC 7

- Thiazide-type diuretics should be used as initial therapy for most patients, either alone or in combination with one of the other classes (ACEIs, ARBs, BBs, CCBs) that have also been shown to reduce one or more hypertensive complications in randomized controlled outcome trials.

- Selection of one of these other agents as initial therapy is recommended when a diuretic cannot be used or when a compelling indication is present that requires the use of a specific drug ...

- If the initial drug selected is not tolerated or is contraindicated, then a drug from one of the other classes proven to reduce CV events should be substituted.

Meta-analysis of Low-dose Diuretics versus Placebo

<table>
<thead>
<tr>
<th>Outcome</th>
<th>RR</th>
<th>P</th>
<th>Diuretics better</th>
<th>Diuretics worse</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHD</td>
<td>0.79</td>
<td>0.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart failure</td>
<td>0.51</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>0.71</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD events</td>
<td>0.76</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD mortality</td>
<td>0.81</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total mortality</td>
<td>0.90</td>
<td>0.002</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Final Outcomes Results
Doxazosin vs. Chlorthalidone
Relative Risk and 95% Confidence Intervals

CHD
1.03 (0.92 - 1.15)

All-Cause Mortality
1.03 (0.94 - 1.13)

Combined CHD
1.07 (0.99 - 1.16)

Stroke
1.26 (1.10 - 1.46)

Heart Failure
1.80 (1.61 - 2.02)

Combined CVD, p< 0.0001
1.20 (1.13 - 1.27)

Favors Doxazosin
Favors Chlorthalidone

Hypertension 2003;42:239-246
ALLHAT

Major Outcomes

Relative Risks and 95% Confidence Intervals

Amlodipine/Chlorthalidone

- CHD: 0.98 (0.90-1.07)
- All-Cause Mortality: 0.96 (0.89-1.02)
- Stroke: 0.93 (0.82-1.06)
- Combined CVD: 1.04 (0.99-1.09)
- Heart Failure: 1.38 (1.25-1.52)
- ESRD: 1.12 (0.89-1.40)

Favors Amlodipine
Favors Chlorthalidone

JAMA 2002;288:2981-2997
ALLHAT

Major Outcomes

Relative Risks and 95% Confidence Intervals

Lisinopril/Chlorthalidone

- CHD: 0.99 (0.91-1.08)
- All-Cause Mortality: 1.00 (0.94-1.08)
- Stroke: 1.15 (1.02-1.30)
- Combined CVD: 1.10 (1.05-1.16)
- Heart Failure: 1.19 (1.07-1.31)
- ESRD: 1.11 (0.88-1.38)

Favors
Lisinopril
Favors
Chlorthalidone

JAMA 2002;288:2981-2997
Hypertension Treatment by Drug Class

- Calcium Channel Blockers
- Beta Blockers
- Diuretics
- ACE Inhibitors
- ARBs

IMS Health NDTI, 1978-2004
Hypertension Treatment by Drug Class

IMS Health NDTI, 1978-2004
Drug Utilization by Drug

Total Prescriptions

Lisinopril
HCTZ
Amlodipine

IMS Health NDTI, 1978-2004
Thiazide Diuretic Use for Hypertension, US, 2001-06
Proportion of all compound uses, IMS Health NDTI
U.S. Hypertension Guidelines

- **JNC 7**: Thiazide-type diuretics should be initial drug therapy for most, either alone or combined with other drug classes.

- **VA-DoD CPGs**: Thiazide-type diuretics are preferred in patients with uncomplicated hypertension; most compelling indications should include a diuretic.
Antihypertensive Medications in VA
Percent Patient Utilization

<table>
<thead>
<tr>
<th>Year</th>
<th>ACEI</th>
<th>BB</th>
<th>Thiazide</th>
<th>CCB</th>
<th>Alpha</th>
<th>Loop</th>
<th>Other</th>
<th>ARB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>56</td>
<td>37</td>
<td>23</td>
<td>18</td>
<td>9</td>
<td>5</td>
<td>5</td>
<td>3</td>
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<tr>
<td>2001</td>
<td>63</td>
<td>49</td>
<td>41</td>
<td>44</td>
<td>20</td>
<td>17</td>
<td>5</td>
<td>11</td>
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<td>2002</td>
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<td>2003</td>
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<td>2004</td>
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<td>2005</td>
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</tbody>
</table>
Multi-Drug Therapy in VA
Percent on Thiazide

2 Meds

3 Meds

2000
2001
2002
2003
2004
2005

0 10 20 30 40 50 60

2 Meds

3 Meds

40

54
Antihypertensive Medications in VA
Percent Monotherapy
Achieving BP Goal With or Without Drug in 2-Drug Combinations: VA Single-Drug Therapy Study

VA Thiazide Diuretic Performance Measurement starting in FY 07

- **Universe:**
  - Outpatients with a diagnosis of hypertension AND
  - Actively on antihypertensive therapy

- **Measure(s):** Outpatients with a diagnosis of uncomplicated hypertension on:
  - Antihypertensive mono-drug therapy which consists of a thiazide diuretic
  - Antihypertensive multi-drug therapy which includes a thiazide diuretic
VA Thiazide Diuretic Measure
Uncomplicated Exclusions due to Compelling Indications

- Patients with an outpatient diagnosis at any facility within the past twenty-four months prior to the end date of the rolling three month period being evaluated as follows:
  - Diabetes
  - Post AMI
  - Supraventricular Tachycardia
  - Angina
Initial Combinations of Medications*

Can add: reserpine, aldosterone antagonist or amiloride, $\alpha$-blocker, alternative CCB, vasodilator, $\beta$-blocker, $\alpha\beta$-blocker, and/or central agonist

* Compelling indications may modify this.
Improving the Care of the Hypertensive Patient: US Perspective

Conclusions - 1

- Hypertension in the U.S. increased in prevalence until 1999: 70 million.
  - Preventive efforts should be intensified on many fronts, especially lifestyle changes in prehypertensive individuals.

- BP control rates have increased in the U.S. since 1999-2000, especially in minorities, but still remains less than the 50% “Healthy People 2010” goal.
BP control rates have increased even more in some practice settings such as the VA: audit and feedback appear central.

Better BP control is associated with increases in dosing and numbers of drugs.

Thiazide diuretic use should continue to increase both for better CV prevention and improved BP control.

We have an excellent armamentarium of lifestyle methods and AHT drugs – further education is needed on how to use them.