Hypertension:  
What’s new since JNC 7  

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Disclosures

Spectral Diagnostics – Site investigator
Eli Lilly – Site investigator

ACP – IM –ITE writing committee
NBME – Step 3 Acute Care committee
Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure
Aram V. Chobanian, George L. Bakris, Henry R. Black, William C. Cushman, Lee A. Green, Joseph L. Izzo, Jr, Daniel W. Jones, Barry J. Materson, Suzanne Oparil, Jackson T. Wright, Jr, Edward J. Roccella and the National High Blood Pressure Education Program Coordinating Committee

*Hypertension*. 2003;42:1206-1252; originally published online December 1, 2003;
U.S. HYPERTENSION GUIDELINES

- 1977 – JNC 1
- 1980 – JNC 2
- 1984 – JNC 3
- 1988 – JNC 4
- 1993 – JNC 5
- 1997 – JNC 6
- 2003 – JNC 7 (delayed waiting for ALLHAT)
- 20?? – JNC 8
Evidence Hierarchy

More of This

And less of This

Systematic

Evidence Hierarchy
JNC-Wait

- Report was completed over a year ago
- Evidenced based
- Unfortunately the existing evidence is not good
- Stakeholders who review were not happy
- NLHBI likely will give up guidelines and defer to societies
Other Guidelines

- Canadian 2011
- British 2012
- European 2013
It’s tough to make predictions. Especially about the future

Yogi Berra
Finally

- JNC 8 --> AHA/ASH 2013 Hypertension Guidelines
- To be presented next week at AHA MTG IN DALLAS
What’s new since JNC 7

- How should we measure BP?
- What are our BP goals?
- Are there different BP goals for different populations?
- What drugs should we use?
- Are there other things we should measure?
- Newer non-pharmacologic treatments
Trends in Drug Treatment
How should we measure Blood Pressure?
1917 office Blood Pressure accepted as part of Physical Examination
Question

In an observational study of BP measurement in various settings (office, hospital, skilled nursing facility, home health) what percentage of BP measurements were done according to the guidelines?

1. 60%
2. 30%
3. 10%
4. 0%

Grim et al. *Can J Cardiol* 1995;11 (suppl H):38H-42H.
Blood Pressure Measurement

How many errors of BP measurement do you see?
1. One
2. Two
3. Three
4. Four
5. Five
6. Six
BP TRU

- Automated in-office device
- Obtains a series of readings
  - 1st reading with clinician present
  - 5 additional readings at 1-5 min intervals
- Drops the first reading
- Usually 10 mm Hg less than office
- More closely aligned with ambulatory monitoring than office BP
Home Blood Pressure Monitoring

✓ Correlates better with 24 hour ambulatory monitoring
✓ Better predictor of end-organ damage than office BP
✓ Engages patient → leads to better control
Home Blood Pressure Monitoring

- Need to train patient
- Record 3 readings twice a day for 1-2 weeks
24 Hour Ambulatory Monitoring
Blood Pressure Is Highly Variable Over a 24-Hour Period

Ambulatory Blood Pressure Monitoring
- Identifies White Coat and Masked Hypertension
- Identifies symptomatic orthostasis
- Best predictor of end-organ damage
- Lack of nocturnal dipping increases CV risk
  - African-Americans
  - CKD
  - Diabetes
- Pressure load associated with CV risk
- Excessive variability associated with increased CV risk
- Exaggerated early morning surge associated with increased CV risk

Allows you to tailor therapy
Chronotherapy

Correlation of Measurements to Echocardiographic Combined Wall Thickness
n=55

<table>
<thead>
<tr>
<th></th>
<th>Ambulatory BP</th>
<th>Multiple Office BP</th>
<th>Single Office BP</th>
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</thead>
<tbody>
<tr>
<td>Systolic</td>
<td>0.54</td>
<td>0.38</td>
<td>0.09</td>
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<tr>
<td>Diastolic</td>
<td>0.63</td>
<td>0.33</td>
<td>0.05</td>
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What are Treatment goals?

< 140/90

- No studies have shown a benefit to achieving lower levels (await results of Sprint Trial – 2018)
- No studies have specifically evaluated treatment in patients with stage 1 HTN
Are there Different Goals in Different Populations?

- Diabetes
- Underlying CV disease
- Chronic Kidney Disease
- Very Elderly
ACCORD Trial

Primary Outcome
Nonfatal MI, Nonfatal Stroke or CVD Death

HR = 0.88
95% CI (0.73-1.06)

Total Stroke

HR = 0.59
95% CI (0.39-0.89)

NNT for 5 years = 89
ACCORD Trial

ACCORD Blood Pressure Lowering

- Cumulative Serious Events: 77
- Hypotension: 17
- Conduction Disturbances: 3
- Hyperkalemia: 9

Hypertension in Coronary Artery Disease and “High Risk” Groups

- No Intent to Treat RCT addresses this
- Lower Achieved BP has been associated with no benefit or worsened outcomes in post hoc analysis of trials
  - INVEST  DM and CAD
  - ONTARGET  Vascular disease or DM NEJM 358:1547-1559
  - I-PRESERVE  Diastolic CHF

JAMA July 7,2010;304(1)61-68, NEJM 358:1547-1559
CKD

✓ MDRD
✓ AASK
MDRD

AASK Trial

JAMA. 2002;288(19):2421-2431
AASK Trial Follow-up

HYVET

- Only HTN RCT in Patients ≥80 years
- N=3850 mean age 83 mean SBP 173
- Goal SBP<150, mean achieved SBP =143
- Placebo vs perendipril/indapamide
- 18 month BP separation -15/6 mmHg

Take Home

Age > 80 – BP goal < 150/90
What Drugs should we use?
ACCOMPLISH Trial

- Benazepril/HCTZ (B+H) (events=38)
- Benazepril/amlodipine (B+A) (events=24)

Log-rank p-value = 0.0566

Number at Risk

<table>
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<tr>
<th>Time to 1st CV Event (months)</th>
<th>B+H</th>
<th>B+A</th>
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<tr>
<td>0</td>
<td>285</td>
<td>288</td>
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<td>6</td>
<td>280</td>
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<tr>
<td>42</td>
<td>141</td>
<td>151</td>
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</tbody>
</table>

β-Blockers (single action)

- Less effective for BP lowering
- No evidence for cardiovascular protection
- Possibility of increase stroke risk

Relegated to 3\textsuperscript{rd} line agent
Duel Action β-blockers maybe different
What about Combination ACE/ARB/Renin inhibitor

On-Target (ACE + ARB) → Combination had worse outcome

VA Nephron-D (ACE + ARB) → study halted for futility and adverse events

Altitude (Aliskerin + ACE or ARB) → Trial halted secondary to increased CV event

Take Home
Do not use combination
What Diuretic should I use

- HCTZ 12.5/25 has not been evaluated
- Indapamide/Chlorthalidone more potent and have longer half life
- These agents appear more effective (but unfair comparison)
Combination medication

✓ Combination pills are more convenient
✓ Combination pills tend to be more efficacious
Aldosterone antagonists

✓ Excellent for treatment of resistant hypertension
✓ Excellent for treatment of hypertension in metabolic syndrome
Drug treatment of Hypertension

- ACE/ARB
- Dihydropyridine
- Diuretic (chlorthalidone/Indapamide)
- Aldosterone antagonists
Central Aortic Pressure

Nichols ww, Singh Bm. Curr Opin Cardiol 17:543, 2002
Relationship of Augmentation Index to Survival in ESRD
Cafe Study

PULSE WAVE VELOCITY

- A simple method to assess arterial stiffness and distensibility
- A long-established and widely used technique
- Non-invasive, accurate and reproducible
- The faster the pulse wave the stiffer the artery
- > 10 m/s increases CV risk
Pulse Wave Velocity

For each 1 m/sec increase in PV there is a 10-14% increase in CV events
Newer Therapy

Renal Nerve Denervation
Carotid baroreceptor stimulation
Simplicity HTN-2 Trial
Renal denervation

Simplicity HTN-2 Trial
Renal denervation

Carotid baroreceptor stimulation
Carotid Stimulation

Conclusions

✓ We are doing a better job
✓ Ambulatory BP monitoring better predictor of CV events
✓ Treatment goal < 140/90 in most populations
✓ Lowering BP is more important than the drugs we use
✓ Most patients will require 2 or more drugs
✓ ACE/ARB + Dihydropyrrine
✓ Consider combinations
✓ β-blockers are third line treatments
✓ Combination Renin-angiotensin blockers are OUT
✓ Aldosterone antagonists are excellent agents
✓ There are other measurements that may be useful
✓ There are new non-pharmacologic treatments