An Update on The Eighth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8): The Evidence-Based Process

Daniel T. Lackland

Disclosure

• Member of JNC 8 panel
• No other disclosures

Instead of JNC 8

• JNC Late
• JNC Wait
• JNC 9
• JNC Ache

Proposed Reasons for Delays

• Panel is lazy
• Panel does not know what they doing
• Too much wine at meetings
• Panel members do not like each other
• The epidemiologist!!!!

Outline

• Hypertension Risks and Previous JNC Reports
• Evidence-based approach for JNC 8
• Lifestyle
• Adherence
• Summary

| 30-year mortality risk ratios for elevated blood pressure controlling for age, SES, smoking, cholesterol and diabetes: Charleston and Evans County Heart Studies |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | White Males     | White Females   | Black Males     | Black Females   |
| 140/90          | 1.8 (1.2, 2.0)  | 1.4 (1.1, 2.0)  | 2.1 (1.3, 3.1)  | 2.0 (1.2, 2.8)  |
| 160/95          | 1.8 (1.3, 2.2)  | 2.0 (1.2, 2.6)  | 2.4 (1.5, 3.5)  | 2.4 (1.6, 3.2)  |

Lackland Clinical and Experimental Hypertension, 1995
Risk of increased systolic blood pressure consistent through all age groups

One Million Adults, 61 Prospective Studies

Ischemic Heart Disease Mortality

Stroke Mortality

CV Mortality* Risk Doubles with Each 20/10 mm Hg BP Increment*


Mortality (absolute risk and 95% CI)

<table>
<thead>
<tr>
<th>SBP (mm Hg)</th>
<th>CV mortality risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>115/75</td>
<td>1</td>
</tr>
<tr>
<td>135/85</td>
<td>2</td>
</tr>
<tr>
<td>155/95</td>
<td>3</td>
</tr>
<tr>
<td>175/105</td>
<td>4</td>
</tr>
</tbody>
</table>

Reduction in SBP – 20/10 mm Hg

Lackland. CURRENT OPINION IN NEUROLOGY 26:8-12, 2013.
Hypertension Prevalence, Awareness, Treatment and Control by Region

Odds Ratio for Southeast residence adjusting for age, race and gender

Primary Outcome: Ischemic & Hemorrhagic Stroke
Ischemic Stroke & Intracerebral Hemorrhage

• Higher Target Group: 13 (0.4%/yr) HR 0.77 (0.60, 1.00) p value 0.08
• Lower Target Group: 6 (0.11 %/yr) HR 0.37 (0.04, 3.91) p value 0.40

International Stroke Conference 2013

Conclusions

• Achieving a lower systolic blood pressure target was feasible, safe and well tolerated.
• Targeting a systolic blood pressure < 130 mm Hg is likely to reduce recurrent stroke by about 20% (caveat: p=0.08).
• The lower blood pressure target significantly reduced intracerebral hemorrhage by two thirds.
• Previous trials of blood pressure lowering after stroke are consistent with our results.

International Stroke Conference 2013

Summary

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Scientific Evidence Underlying ACC/AHA Guidelines

- Of 16 current GL with Level Of Evidence recommendations
  - 11% (314/2711) are A
  - 48% (1246/2711) are C
- Only 9% (245/2711) are Class I and Level of Evidence A

(JAMA, 2009; 301: 831-841)
Adult CVD Guidelines: NHLBI Approach

- Advice to NHLBI from advisory groups:
  - Update risk factor guidelines (hypertension, cholesterol, obesity)
  - Develop an integrated guideline
  - Use an evidence-based approach including systematic reviews
- The NHLBI guideline development process
  - Was established to assure rigor and to minimize bias
  - Methods being used to meet many of the new IOM standards
- Two recent IOM reports set new standards
  - “Finding What Works in Health Care” - standards for systematic reviews
  - “Clinical Practice Guidelines We Can Trust” - standards for developing trustworthy CPGs

How the Process Has Evolved

- Strictly evidence-based
- Focus only on randomized controlled trials assessing important health outcomes (no use of intermediate/surrogate measures)
- Every included study is rated for quality by two independent reviewers using standardized tools
- Evidence statements graded for quality using pre-specified criteria
- Separate grading for recommendations
- Independent methodology team to ensure objectivity of the review
- Initial set of recommendations focused on 3 key questions

Evidence-Based Clinical Practice Guidelines for CVD Prevention

Expertise Represented

- Hypertension, primary care, cardiology, nephrology, clinical trials, research methodology, evidence-based medicine, epidemiology, guideline development and implementation, nutrition/lifestyle, nursing, pharmacology, systems of care, and informatics

Evidence-Based Clinical Practice Guidelines for CVD Prevention

Question selection process

- Panel chairs and NHLBI staff developed draft questions based on expertise, literature, and colleague discussions
- Panel reviewed, revised, added/deleted questions resulting in 23 questions
- 5 questions were identified with highest priority
- The 5 questions were prioritized by the panel

Evidence-Based Clinical Practice Guidelines for CVD Prevention

Rationale for the Questions

- Interest in assessing the evidence to support 140/90 mm Hg as a treatment threshold or goal
- Should the treatment threshold/goal be lower in populations with diabetes, chronic kidney disease, coronary artery disease, stroke, and other co-morbidities or characteristics?
- Should the treatment threshold/goal be different in older adults?
- Use of different treatment thresholds and goals is confusing
- Is there evidence that treatment to lower BP with a particular drug or drug class improves outcomes compared to another?

Evidence-Based Clinical Practice Guidelines for CVD Prevention

NHLBI CVD Prevention Guidelines

Expert Panels and Work Groups

Evidence-Based Clinical Practice Guidelines for CVD Prevention

Five Draft Reports released for public comment, one at a time

Evidence-Based Clinical Practice Guidelines for CVD Prevention
NHLBI Evidence Quality Grading and Recommendation Strength

**Evidence Quality**
- **High**
  - Well-designed and conducted RCTs
- **Moderate**
  - RCTs with minor limitations
  - Well-conducted observational studies
- **Low**
  - RCTs with major limitations
  - Observational studies with major limitations

**Recommendation Strength**
- A - Strong
- B - Moderate
- C - Weak
- D - Against
- E - Expert Opinion
- N - No Recommendation

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**Question 1**

➢ Among adults with hypertension, does initiating antihypertensive pharmacological therapy at specific BP thresholds improve health outcomes?
  - When to initiate drug treatment?

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**Question 2**

➢ Among adults, does treatment with antihypertensive pharmacological therapy to a specified BP goal lead to improvements in health outcomes?
  - How low should you go?

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**Question 3**

➢ In adults with hypertension, do various antihypertensive drugs or drug classes differ in comparative benefits and harms on specific health outcomes?
  - How do you get there?

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**Inclusion/Exclusion Criteria**

- **Randomized Controlled Trials**
  - Less bias and standard for efficacy and effectiveness
  - 1966-present time period
  - Minimum 1-year follow-up
  - Studies with sample size less than 100 excluded

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**Populations Included**

- Adults 18 years of age and older
- Prespecified subgroups including:
  - Diabetes
  - Chronic kidney disease
  - Proteinuria
  - Coronary artery disease
  - Peripheral artery disease
  - Previous stroke
- Heart failure
- Older Adults
- Men and women
- Racial and ethnic groups
- Smoking
Outcomes

- Overall mortality, CVD-related mortality, CKD-related mortality, myocardial infarction, heart failure, hospitalization for heart failure, stroke
- Coronary revascularization (includes coronary artery bypass surgery, coronary angioplasty and coronary stent placement), peripheral revascularization (includes carotid, renal, and lower extremity revascularization)
- End stage renal disease (i.e., kidney failure resulting in dialysis or transplant), doubling of creatinine, halving of eGFR

Literature Review and Assessment Process

- Systematic search of literature for the CQ
  - Citations found using inclusion/exclusion criteria
  - Papers screened and reviewed for inclusion
  - Result: unbiased list of studies based on a priori criteria
- Quality of each included study rates
  - Good, fair, poor
- NHLBI study rating instruments
  - Controlled intervention studies
  - Cohort and cross-sectional studies
  - Case-control studies
  - Systematic reviews and meta-analyses

NHLBI Assessment Tool

- 2 reviews
- Quality rating
- Reasons for poor
- Randomization description, blinding, etc

Data Abstraction and Evidence Tables

- Information from individual studies (key data, sample size, intervention, results, comparisons
- Evidence by critical question (tables and text relevant to critical questions
- Graded evidence statements (multiple evidence statements for each critical question
- Graded recommendations (multiple evidence statements could result in one recommendation)

Question 1: Among adults with hypertension, does initiating antihypertensive pharmacological therapy at specific BP thresholds improve health outcomes?

Articles Screened:

- Included: 44
- Excluded: 1,452

Question 2: Among the adults, does treatment with antihypertensive pharmacological therapy to a specified BP goal lead to improvements in health outcome?

Articles Screened:

- Included: 92
- Excluded: 1,886
Question 3: In adults with hypertension, do various antihypertensive drugs or drug classes differ in comparative benefits and harms on specific health outcomes?

Articles Screened = 2662
Included = 101
Good = 15
Fair = 51
Total Abstracted = 66
Poor = 35
Excluded = 2561
(Did not meet prespecified inclusion criteria)

Evidence-Based Clinical Practice Guidelines for CVD Prevention

Conclusion

The new NHLBI-sponsored adult CV guideline reports

- Are strictly evidence based
- Will not look like the previous guidelines
- Will have more depth and rigor; will have less breadth
- Will use evidence based strategies for implementation

New reports vs Previous reports

- The new guideline reports will not look like the previous guidelines:
  - Recommendations are based on systematic reviews of RCTs
  - Restricted to a few critical questions
  - More depth, less breadth (More rigor, less comprehensive)
- The new guideline reports will look more similar to each other than in the past
  - Previous reports used different methods and structure
  - New reports are using the same methods and structure

Where are we?

- Evidence statements and recommendations
- Draft report
- Review of the draft report by:
  - Other federal agencies (CDC, CMS, AHRQ, HRSA, VA, etc.)
  - Invited organizations and individuals
  - Public
- Revisions based on comments received – current
- Final report

Outline

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- Evidence-based approach for JNC 8
- Lifestyle
- Adherence
- Summary
**Benefit of Lifestyle Modifications in Hypertension Management**

<table>
<thead>
<tr>
<th>Initial Drug Therapy</th>
<th>Without Compelling Indication</th>
<th>With Compelling Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Classification</td>
<td>Lifestyle Modification</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>Encourage</td>
<td></td>
</tr>
<tr>
<td>Pre-hypertension</td>
<td>Yes</td>
<td>Drug(s) for the compelling indications</td>
</tr>
<tr>
<td>Stage 1 hypertension</td>
<td>Yes</td>
<td>Drug Therapy</td>
</tr>
<tr>
<td>Stage 2 hypertension</td>
<td>Yes</td>
<td>Drug Therapy</td>
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**Benefit of Lifestyle Modifications**

- DASH Diet: 8-14 mmHg
- Weight Loss: 10Kg - 5-20 mmHg
- Low Sodium Diet: 2-8 mmHg
- Reduce Alcohol Intake: 2-4 mmHg
- Regular Exercise: 4-9 mmHg

**Dietary Approaches to Stop Hypertension**

The Dash Diet

- 8 Weeks of DASH Diet
  - Systolic: -11.6 mmHg
  - Diastolic: -5.3 mmHg

African Americans

- 8 Weeks DASH Diet
  - Systolic: -13.2 mmHg
  - Diastolic: -6.1 mmHg

**Benefit of Lifestyle Modifications in Hypertension Management**

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**Dietary Recommendations**

- Hypertensive patients and normotensive individuals at increased risk of developing hypertension consume a diet that emphasizes fruits, vegetables and low-fat dairy products, dietary and soluble fiber, whole grains and protein from plant sources and that is reduced in saturated fat and cholesterol (Dietary Approaches to Stop Hypertension [DASH] diet) (Grade B).
Weight Reduction

- Height, weight, and waist circumference should be measured and body mass index calculated for all adults (Grade D).
- Maintenance of a healthy body weight (body mass index 18.5 to 24.9 kg/m² and waist circumference less than 102 cm for men and less than 88 cm for women) is recommended for non-hypertensive individuals to prevent hypertension (Grade C) and for hypertensive patients to reduce blood pressure (Grade B).
- All overweight and obese hypertensive individuals should be advised to lose weight (Grade B).
- Weight loss strategies should employ a multidisciplinary approach that includes dietary education, increased physical activity and behavioral intervention (Grade B).

Benefit of Lifestyle Modifications in Hypertension Management

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Sodium Facts

- Sodium increases the risk of heart attack and stroke in all people—even those without high blood pressure.
- Cutting out just one gram of sodium a day, the amount found in a ½ teaspoon of salt, can decrease the risk of a heart attack or stroke by 25 percent.


Most Salt Comes from Processed and Restaurant Foods

How much sodium is in a Chicken Cesar Salad at the Costco Food Court?
A. 2680 mg
B. 725 mg
C. 1130 mg
D. 2060 mg

How much sodium is an order of PF Chang’s, double pan fried noodles with pork?
A. 1500 mg
B. 7900 mg
C. 2700 mg
D. 4300 mg
Goal: 20% Reduction in Sodium Intake in 5 Years

- Decrease sodium content in foods by 25% over 5 years
- Decrease population sodium intake by ~20% over 5 years

Reductions will vary among food categories

Salt Intake

- For prevention and treatment of hypertension, a dietary sodium intake of 1500 mg (65 mmol) per day is recommended for adults age 50 years or less; 1300 mg (57 mmol) per day if age 51 to 70 years; and 1200 mg (52 mmol) per day if age greater than 70 years (Grade B).

Energy Content of Alcoholic Beverages

<table>
<thead>
<tr>
<th>Alcohol</th>
<th>Grams</th>
<th>Calories</th>
</tr>
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<tbody>
<tr>
<td>Beer</td>
<td>12 oz</td>
<td>160</td>
</tr>
<tr>
<td>Wine</td>
<td>5 oz</td>
<td>100</td>
</tr>
<tr>
<td>Margarita</td>
<td>8 oz</td>
<td>270</td>
</tr>
<tr>
<td>Gin and Tonic</td>
<td>8 oz</td>
<td>190</td>
</tr>
<tr>
<td>(contains 1.7 oz gin)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 shot of liquor</td>
<td>2 oz</td>
<td>128</td>
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Alcohol Consumption

- Healthy adults should limit alcohol consumption to two drinks or less per day, and consumption should not exceed 14 standard drinks per week for men and nine standard drinks per week for women (Grade B).

- One standard drink is considered 13.6 g or 17.2 ml of ethanol, or approximately 44 ml (1.5 oz) of 80 proof (40%) spirits, 355 ml (12 oz) of 5% beer or 148 ml (5 oz) of 12% wine.
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</table>

**Energy Expenditure of Physical Activity**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Energy Expenditure (kcal/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All out competitive sports</td>
<td>~1200</td>
</tr>
<tr>
<td>Running 10 mph</td>
<td>~800</td>
</tr>
<tr>
<td>Running 6 mph</td>
<td>~400</td>
</tr>
<tr>
<td>Climbing stairs</td>
<td>~200</td>
</tr>
<tr>
<td>Sexual intercourse</td>
<td>~50</td>
</tr>
<tr>
<td>Gardening</td>
<td>~20</td>
</tr>
<tr>
<td>Walking 4 mph</td>
<td>~10</td>
</tr>
<tr>
<td>Walking 2 mph</td>
<td>~5</td>
</tr>
<tr>
<td>Chewing gum (1 kcal/h)</td>
<td>~1</td>
</tr>
</tbody>
</table>

**Effect of Low-Activity (1000 kcal/wk) and High-Activity (2500 kcal/wk) on Body Weight**

- Behavior therapy + Low activity
- Behavior therapy + High activity

**Effect of Long vs Short Bouts of Exercise on Total Amount of Activity and Weight Loss**

- Long bout = one 40 min session.
- Short bout = four 10 min sessions.

**Physical Exercise**

- For nonhypertensive individuals to prevent hypertension or for hypertensive patients to reduce their blood pressure: 30 to 60 minutes of moderate intensity dynamic exercise (such as walking, jogging, cycling or swimming) four to seven days per week in addition to the routine activities of daily living (Grade D).

- Higher intensities of exercise are no more effective (Grade D).

- For non-hypertensive or stage 1 hypertensive individuals, the use of resistance or weight training exercise (such as free weight lifting, fixed-weight lifting, or handgrip exercise) does not adversely influence BP (Grade D).

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“Drugs don’t work in patients who don’t take them”

-- C. Everett Koop, MD, Former US Surgeon General

What percent of prescription medications are actually taken as directed?

• ___ 90%
• ___ 75%
• ___ 50%
• ___ 25%

Medication Use Continuum

How Can Health Coaches Support Medication Adherence?

• “The key to effective BP control appears to have more to do with patient and physician information exchange (or lack thereof) than with biology or drug failure.”


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Summary

• The hypertension control efforts have been effective
• JNC 8 will be evidence based and should also have an effect on control and lower disease outcomes
• Public health and lifestyle including sodium restriction provide an essential component of high blood pressure control
• Patient adherence is an important component of BP control