Challenges in Hypertension: Incorporating Evolving Clinical Data Into Practice
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Disclosures

- **Jan Basile, MD** serves as on the speakers bureau for Amgen, Arbor, and Janssen. Dr. Basile also serves as a consultant for Novartis. Additionally, Dr. Basile serves as a researcher for Medtronic and on the writing committee for Up-to-date.
Learning Objectives

- Recognize the evolving epidemiology and control rates of hypertension
- Review proper blood pressure (BP) measurement technique and the role of office, home, and 24-hr ambulatory BP measurement in everyday clinical practice
- Discuss the impact of recent trials and recommendations on evolving BP treatment goals
- Recognize current recommendations for first-line agents in the treatment of hypertension
PRE-TEST QUESTIONS
Pre-test ARS Question 1

A recent study from Kaiser Permanente reported BP control to <140/90 mmHg in as much as what proportion of patients?

1. 60%
2. 70%
3. 80%
4. 90%
Pre-test ARS Question 2

Of the following BP measurements, which demonstrates the lowest correlation with clinical outcomes?

1. Office BP
2. Daytime home BP
3. Nighttime home BP
4. 24-hour BP monitoring
Recently recommended systolic BP targets in various at-risk populations include all of the following, EXCEPT:

1. <150 mmHg
2. <140 mmHg
3. <130 mmHg
4. <120 mmHg
5. <110 mmHg
Which of the following thiazide/thiazide-like diuretics has the shortest half-life?

1. Metolazone
2. Indapamide
3. Chlorothalidone
4. Hydrochlorthiazide
According to JNC 8, all of the following antihypertensive drug classes are appropriate for initial treatment of an uncomplicated hypertensive patient, EXCEPT:

1. Beta-blocker
2. ACE inhibitor or ARB
3. Thiazide-type diuretic
4. Calcium channel blocker
Please rate your confidence in incorporating evolving clinical data into your management of patients with Hypertension:

1. Not at all confident
2. Slightly confident
3. Moderately confident
4. Pretty much confident
5. Very confident
The Impact of Hypertension

- 1 in 3 US adults ≥20 years of age has hypertension
- BP >140/90 mmHg in
  - 69% of people who have a first heart attack,
  - 77% of those who have a first stroke, and
  - 74% of those who have HF
- Poor adherence is a major barrier to effective BP control
  - ~57% remain adherent at 2 years
- HTN increases mortality
  - contributes to 360,000 deaths/year in the US
  - shortens life expectancy by ~5 years compared to normotensive people

Awareness, Treatment, and Control of HTN by Race/Ethnicity: NHANES 2007–2012

Kaiser Permanente Hypertension Control Rates 2001-2009

Control < 140/90 mmHg

KPNC=Kaiser Permanente Northern California
HEDIS=Healthcare Effectiveness Data and Information Set
JAMA. 2013 Aug 21; 310(7): 699–705
Kaiser Permanente Hypertension Algorithm

BP Goal < 140/90 mm Hg

ACE-Inhibitor\(^2\) / Thiazide Diuretic

Lisinopril / HCTZ
(Advance as needed)
20 / 25 mg X \( \frac{1}{2} \) daily
20 / 25 mg X 1 daily
20 / 25 mg X 2 daily

Pregnancy Potential: Avoid ACE-Inhibitors\(^2\)

If not in control

Calcium Channel Blocker
Add amlodipine 5 mg X \( \frac{1}{2} \) daily \( \rightarrow \) 5 mg X 1 daily \( \rightarrow \) 10 mg daily

If not in control

Beta-Blocker OR Spironolactone
Add atenolol 25 mg daily \( \rightarrow \) 50 mg daily (Keep heart rate > 55)
OR
IF on thiazide AND eGFR \( \geq \) 60 ml/min AND K < 4.5
Add spironolactone 12.5 mg daily \( \rightarrow \) 25 mg daily

If not in control

If ACEI intolerant or pregnancy potential

Chlorthalidone 12.5 mg \( \rightarrow \) 25 mg
OR
HCTZ 25 mg \( \rightarrow \) 50 mg

If not in control

Go, AS et al J Am Coll Cardiol. 2013
## Limitations of Office Blood Pressure Measurement

### CHALLENGES TO ACCURATE OFFICE BLOOD PRESSURE MEASUREMENTS

- Insufficient number of readings, plus inherent variability of blood pressure in the office
- Poor technique (eg, operator use and equipment status)
- White coat effect
- Masked effect

Poor BP Measurement Technique May Be Associated with Elevated BP in the Office

BP Devices

BPTru, Omron HEM-907, Welch Allyn PRO BP 2400
BP Measurement in the Office in Established Patient

1. Preferably taken before the patient sees the provider
2. First, 5 minutes of rest (built into the device to wait 5 min)
   - no conversation
   - seated comfortably with feet on the floor
   - arm at heart level
   - no tobacco or caffeine for 30 minutes before BP
   - have the examiner leave the room
3. Take 2-3 seated readings 1 minute apart (averaged) using an automated oscillometric BP device (AOBP)
4. An upright reading (after 1 minute of quiet standing)
White-Coat and Masked Hypertension

Office measurement
SBP mmHg

- Office measurement
- True Hypertensive
- Masked Hypertension
- True Normotensive

135
140

135
140

Derived from Pickering et al. *Hypertension* 2002:40:795-796
Office, 24-hr, Daytime and Nighttime SBP as Predictors of CV Endpoints: Syst-Eur Study

Systolic blood pressure (mm Hg)

2-yr incidence of CV endpoints

Nighttime
24-hr
Daytime
Conventional (office)

Conclusion: non-office SBP is better predictor of CV events than office BP

# USPSTF Draft Recommendations

## Old Guideline, 2007

<table>
<thead>
<tr>
<th>Population</th>
<th>Recommendation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>The USPSTF recommends screening for high BP in adults age 18 years and older.</td>
<td>A</td>
</tr>
</tbody>
</table>

## New Guideline, 2015

<table>
<thead>
<tr>
<th>Population</th>
<th>Recommendation</th>
<th>Grade</th>
</tr>
</thead>
</table>
| Adults 18 and Older | Use office BP as screening test  
                   | Confirm diagnosis with out of office BP readings prior to initiation of antihypertensive therapy  
                   | - ABPM is reference standard  
                   | - Use home BP monitoring when ABPM not available | A     |
JNC 8 Hypertension Management Algorithm

Adult (age ≥18 years)

Lifestyle Interventions to be applied throughout Treatment Algorithm

Set Blood Pressure Goal and Initiate Blood Pressure Lowering Medication Based on Age, Diabetes, and CKD

- **Age ≥60 years and No Diabetes and No CKD**
  - Goal SBP <150 mm Hg
  - Goal DBP <90 mm Hg
  - Black
    - Initiate thiazide-type diuretic or CCB alone or in combination
  - Nonblack
    - Initiate thiazide-type diuretic or ACEI or ARB or CCB alone or in combination

- **Age <60 years and No Diabetes and No CKD**
  - Goal SBP <140 mm Hg
  - Goal DBP <90 mm Hg

- **All Ages with Diabetes and No CKD**
  - Goal SBP <140 mm Hg
  - Goal DBP <90 mm Hg

- **All Ages with CKD**
  - Goal SBP <140 mm Hg
  - Goal DBP <90 mm Hg
  - All Races
    - Initiate ACEI or ARB alone or in combination with other class

Select a treatment titration strategy: A: maximize first medication before adding second, B: add second medication before reaching maximum dose of first, or C: start with 2 medication classes separately or as fixed dose combination

ACP/AAFP Hypertension Guideline: Adults > 60 Years of Age

1. Start treatment for persistent SBP $\geq 150$ mm Hg, SBP goal $<150$ mm Hg to reduce risk for stroke, cardiac events, and death  --  Strong recommendation, high-quality evidence

2. In patients with history of stroke or TIA, goal SBP $<140$ mmHg to reduce recurrent stroke --  Weak recommendation, moderate quality evidence

3. In high CV risk (eg, diabetes, vascular disease, metabolic syndrome, CKD), SBP goal $<140$ mmHg  --  Weak recommendation, low-quality evidence
AOBP has replaced auscultatory BP measurement
- Provider leaves room, avoiding white-coat effect
- Eliminates conversation with provider or nurse
- Multiple measurements taken, with mean value calculated
- Provides greater visit-to-visit consistency
- Avoids digit preference and rounding

In adults >50 years of age (using AOBP) with SBP ≥130 mmHg and in “selected high-risk patients”*, intensive management to achieve target SBP <120 mmHg is recommended

*Referring to the 4 SPRINT categories of patients-clinical or subclinical CVD, CKD, aged ≥75 years of age, 10-yr CVD risk ≥15%

AOBP=Automated Office Blood Pressure
A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group*

Intensive Group <120 mmHg; Standard Group <140 mmHg
Major Inclusion Criteria

• ≥50 years old (30% AA, 10% Hispanic, 58% White), no upper age exclusion

• Systolic blood pressure
  – SBP: 130 – 180 mmHg on 0 or 1 medication
  – SBP: 130 – 170 mmHg on up to 2 medications
  – SBP: 130 – 160 mmHg on up to 3 medications
  – SBP: 130 – 150 mmHg on up to 4 medications

• Risk (one or more of the following 4 high-risk groups)
  – Presence of clinical or subclinical CVD (not stroke): 20%
  – Chronic kidney disease (eGFR 20–59 mL/min/1.73m²): 28%
  – Framingham Risk Score for 10-year CVD risk ≥15%
    – Not needed if eligible based on preexisting CVD or CKD
  – Age ≥ 75 years: 28%

SPRINT Research Group, NEJM 2015; 373:2103-2116.
SPRINT BP Target

- Measurement of BP by rigorous use of an automated office device (OMRON-HEM907XL) in SPRINT to minimize white-coat effect:
  - No health professional in the room
  - Patients seated in a chair 5 minutes, then 3 readings 1 minute apart
  - Average of these readings = official reading
  - This method likely gives values at least 5-7 mmHg lower than the typical office value*
  - BP monitored monthly for first 3 months then at least every 3 months thereafter

- SPRINT value of 121.5 mmHg translates to an office value of 127 mmHg; in other words, an office target of <130 mmHg


BP Treatment

- Agents from all major antihypertensive drug classes available free of charge
- Classes with best CVD outcomes in trials given priority
  - Chlorthalidone encouraged as thiazide-type diuretic
  - Amlodipine encouraged as CCB

SPRINT Research Group, NEJM 2015; 373:2103-2116.
### Diuretics Used to Treat Hypertension

<table>
<thead>
<tr>
<th>Type</th>
<th>Drug</th>
<th>BA (%)</th>
<th>$T_{\frac{1}{2}}$ (hours)</th>
<th>DOA (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thiazide and Thiazide-like Diuretics</strong></td>
<td>Hydrochlorothiazide</td>
<td>65 – 75</td>
<td>3.0 – 10.0</td>
<td>6 – 12</td>
</tr>
<tr>
<td></td>
<td>Chlorothiazide</td>
<td>30 – 50</td>
<td>15.0 – 25.0</td>
<td>6 – 12</td>
</tr>
<tr>
<td></td>
<td><strong>Chlorthalidone</strong></td>
<td>65</td>
<td>24.0 – 55.0</td>
<td><strong>24 – 72</strong></td>
</tr>
<tr>
<td></td>
<td>Bendroflumethiazide</td>
<td>90</td>
<td>2.5 – 5.0</td>
<td>18 – 24</td>
</tr>
<tr>
<td></td>
<td>Indapamide</td>
<td>90</td>
<td>6.0 – 15.0</td>
<td>24 – 36</td>
</tr>
<tr>
<td></td>
<td>Metolazone</td>
<td>65</td>
<td>14</td>
<td>12 – 24</td>
</tr>
<tr>
<td><strong>Loop Diuretics</strong></td>
<td>Bumetanide</td>
<td>80 – 90</td>
<td>0.3 – 1.5</td>
<td>4-6</td>
</tr>
<tr>
<td></td>
<td>Furosemide</td>
<td>10 – 100</td>
<td>0.3 – 3.4</td>
<td>6-8</td>
</tr>
<tr>
<td></td>
<td>Torsemide</td>
<td>80 – 100</td>
<td>3.0 – 4.0</td>
<td>6-8</td>
</tr>
<tr>
<td><strong>Potassium-Sparing Diuretics</strong></td>
<td>Amiloride</td>
<td>15-20</td>
<td>17.0 – 26.0</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Triamterene</td>
<td>83 (55)$^*$</td>
<td>3.0 (3.0)$^*$</td>
<td>7-9</td>
</tr>
<tr>
<td></td>
<td>Spironolactone</td>
<td>&gt;90</td>
<td>1.5 – 15.0$^*$</td>
<td>48-72</td>
</tr>
<tr>
<td></td>
<td>Eplerenone</td>
<td>69</td>
<td>2.2 – 9.4</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Parentheses denote active metabolite. $^*$The half-life of one active metabolite, potassium canrenoate, is 15 h.

BA = bioavailability; $T_{\frac{1}{2}}$ = half-life; DOA = duration of action; NA = unknown.

Chlorthalidone: Preferred Thiazide-Type Diuretic for HTN

- Greater potency
- 24-hour duration of action
- Much greater evidence base for CV outcome improvement at the current doses recommended (12-25 mg)
SPRINT: Medication Classes by Treatment Group
Last Visit Per Participant Prior to 8/20/2015

Intensive Group < 120 mm Hg; Standard Group < 140 mm Hg.

SPRINT: Systolic BP During Follow-up

Figure 1: Mean Systolic BP (95% CI)

(N=9361)

Year 1

Mean SBP 136.2 mm Hg

Mean SBP 121.4 mm Hg

Standard

Intensive

Average SBP (During Follow-up)

Standard: 134.6 mmHg

Intensive: 121.5 mmHg

Average number of antihypertensive medications

Number of participants

SPRINT Research Group, Figure 2. NEJM 2015; 373:2110.
SPRINT: Primary Outcome*
Cumulative Hazard

Hazard Ratio = 0.75 (95% CI: 0.64 to 0.89)

Standard
(319 events)

Intensive
(243 events)

During Trial (median follow-up = 3.26 years)
Number Needed to Treat (NNT) to prevent a primary outcome = 61

* MI, ACS other than MI, stroke, heart failure**, death from CV causes**
** Primary endpoints statistically significant

SPRINT Research Group, Figure 3. NEJM 2015; 373:2112.
Primary Outcome Experience in Six Pre-specified Subgroups of Interest

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>HR</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>0.75 (0.64, 0.89)</td>
<td></td>
</tr>
<tr>
<td>No Prior CKD</td>
<td>0.70 (0.56, 0.87)</td>
<td>0.36</td>
</tr>
<tr>
<td>Prior CKD</td>
<td>0.82 (0.63, 1.07)</td>
<td></td>
</tr>
<tr>
<td>Age &lt; 75</td>
<td>0.80 (0.64, 1.00)</td>
<td>0.32</td>
</tr>
<tr>
<td>Age ≥ 75</td>
<td>0.67 (0.51, 0.86)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0.84 (0.62, 1.14)</td>
<td>0.45</td>
</tr>
<tr>
<td>Male</td>
<td>0.72 (0.59, 0.88)</td>
<td></td>
</tr>
<tr>
<td>African–American</td>
<td>0.77 (0.55, 1.06)</td>
<td>0.83</td>
</tr>
<tr>
<td>Non African–American</td>
<td>0.74 (0.61, 0.90)</td>
<td></td>
</tr>
<tr>
<td>No Prior CVD</td>
<td>0.71 (0.57, 0.88)</td>
<td>0.39</td>
</tr>
<tr>
<td>Prior CVD</td>
<td>0.83 (0.62, 1.09)</td>
<td></td>
</tr>
<tr>
<td>SBP ≤ 132</td>
<td>0.70 (0.51, 0.95)</td>
<td>0.77</td>
</tr>
<tr>
<td>132 &lt; SBP &lt; 145</td>
<td>0.77 (0.57, 1.03)</td>
<td></td>
</tr>
<tr>
<td>SBP ≥ 145</td>
<td>0.83 (0.63, 1.09)</td>
<td></td>
</tr>
</tbody>
</table>

*Treatment by subgroup interaction
*Unadjusted for multiplicity

All Cause Mortality Experience in Six Pre-specified Subgroups of Interest

**Figure 4: All-Cause Mortality**

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Intensive</th>
<th>Standard</th>
<th>HR</th>
<th>Int P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>155/4678 (3.31)</td>
<td>210/4683 (4.48)</td>
<td>0.73 (0.60,0.90)</td>
<td></td>
</tr>
<tr>
<td>No Prior CKD</td>
<td>85/3348 (2.54)</td>
<td>115/3367 (3.42)</td>
<td>0.75 (0.57,1.00)</td>
<td>0.76</td>
</tr>
<tr>
<td>Prior CKD</td>
<td>70/1330 (5.26)</td>
<td>95/1316 (7.22)</td>
<td>0.73 (0.53,1.00)</td>
<td></td>
</tr>
<tr>
<td>Age &lt; 75</td>
<td>82/3361 (2.44)</td>
<td>104/3364 (3.09)</td>
<td>0.77 (0.58,1.03)</td>
<td>0.58</td>
</tr>
<tr>
<td>Age ≥ 75</td>
<td>73/1317 (5.64)</td>
<td>106/1319 (8.04)</td>
<td>0.68 (0.50,0.92)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>46/1684 (2.73)</td>
<td>54/1648 (3.28)</td>
<td>0.85 (0.57,1.26)</td>
<td>0.49</td>
</tr>
<tr>
<td>Male</td>
<td>109/2994 (3.64)</td>
<td>156/3035 (5.14)</td>
<td>0.71 (0.55,0.91)</td>
<td>*</td>
</tr>
<tr>
<td>African-American</td>
<td>53/1454 (3.65)</td>
<td>55/1493 (3.68)</td>
<td>0.96 (0.65,1.40)</td>
<td>0.06</td>
</tr>
<tr>
<td>Non African-American</td>
<td>102/3224 (3.16)</td>
<td>155/3190 (4.86)</td>
<td>0.64 (0.50,0.82)</td>
<td></td>
</tr>
<tr>
<td>No Prior CVD</td>
<td>106/3738 (2.84)</td>
<td>140/3746 (3.74)</td>
<td>0.75 (0.58,0.96)</td>
<td>0.78</td>
</tr>
<tr>
<td>Prior CVD</td>
<td>49/940 (5.21)</td>
<td>70/937 (7.47)</td>
<td>0.70 (0.48,1.02)</td>
<td></td>
</tr>
<tr>
<td>SBP ≤ 132</td>
<td>46/1583 (2.91)</td>
<td>64/1553 (4.12)</td>
<td>0.73 (0.49,1.07)</td>
<td>0.70</td>
</tr>
<tr>
<td>132 &lt; SBP &lt; 145</td>
<td>41/1489 (2.75)</td>
<td>63/1549 (4.07)</td>
<td>0.69 (0.46,1.03)</td>
<td></td>
</tr>
<tr>
<td>SBP ≥ 145</td>
<td>68/1606 (4.23)</td>
<td>83/1581 (5.25)</td>
<td>0.81 (0.59,1.13)</td>
<td></td>
</tr>
</tbody>
</table>

*p=0.34, after Hommel adjustment for multiple comparisons*
SPRINT: Serious Adverse Events*
Total SAE Similar

<table>
<thead>
<tr>
<th>Condition</th>
<th>Intensive Treatment</th>
<th>Standard Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension</td>
<td>2.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Acute kidney Injury or acute renal failure</td>
<td>4.1</td>
<td>2.5</td>
</tr>
<tr>
<td>≥ 30% reduction in eGFR to &lt;60mL/min/1.73 m² in those w/o CKD on entry</td>
<td>3.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>

HR: 3.49
95% CI: 2.44 - 5.10

*Fatal or life threatening event, resulting in significant or persistent disability, requiring or prolonging hospitalization, or judged important medical event.

<table>
<thead>
<tr>
<th>Laboratory Measures</th>
<th>Intensive</th>
<th>Standard</th>
<th>HR (P Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium &lt;130 mmol/L</td>
<td>180 (3.8)</td>
<td>100 (2.1)</td>
<td>1.76 (&lt;0.001)</td>
</tr>
<tr>
<td>Potassium &lt;3.0 mmol/L</td>
<td>114 (2.4)</td>
<td>74 (1.6)</td>
<td>1.50 (0.006)</td>
</tr>
<tr>
<td>Potassium &gt;5.5 mmol/l</td>
<td>176 (3.8)</td>
<td>171 (3.7)</td>
<td>1.00 (0.97)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthostatic hypotension</td>
<td>777 (16.6)</td>
<td>857 (18.3)</td>
<td>0.88 (0.01)</td>
</tr>
<tr>
<td>Orthostatic hypotension with</td>
<td>62 (1.3)</td>
<td>71 (1.5)</td>
<td>0.85 (0.35)</td>
</tr>
<tr>
<td>dizziness</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Detected on routine or PRN labs; routine labs drawn quarterly for first year, then q 6 months
2. Drop in SBP ≥20 mmHg or DBP ≥10 mmHg 1 minute after standing (measured at 1, 6, and 12 months and yearly thereafter)

SPRINT Research Group, Adapted from Table 3. NEJM 2015; 373:2114.
Implications of SPRINT

- SPRINT likely will change SBP goals in guidelines
- How should BP be checked in office practice?
- Should the SBP goal in SPRINT-like patients be <130 mmHg or something else?
- What about other high-risk populations?
  - Diabetes mellitus (ACCORD BP)
  - Post-stroke (SPS3)
  - 10-yr CVD risk ≥15%, but age <50 years
- What about lower-risk populations?
  - Age 50-74 years, SBP ≥130 mmHg, but lower CVD risk
  - Age <50 years with SBP <140 mmHg

ONE SIZE DOES NOT FIT ALL – INDIVIDUALIZE
Development of HTN Guidelines: The JNCs and Initial Drug Therapy

Earliest guidelines

- NHBPEP starts
- 1972

JNC I
- 1973
- 28 drugs
- DBP ≥105 diuretics

JNC II
- 1976
- 34 drugs
- diuretics

JNC III
- 1980
- 43 drugs
- Low-dose diuretics, β-blockers added

JNC IV
- 1984
- 50 drugs
- ACEI, CAs added

JNC V
- 1988
- 68 drugs
- diuretics/β-blockers

JNC VI
- 1993
- 84 drugs
- 7 options

JNC 7
- 1997
- >125 drugs
- diuretics (ALLHAT)

8th report
- 2003
- December 18, 2013

JNC 7
- 2013

>125 drugs
- diuretics (ALLHAT)
Initial Medications for Management of Hypertension

Lifestyle Modification—Especially Diet and Exercise

Thiazide
Thiazide-Type
Diuretics

ACE inhibitors or ARBs

Calcium antagonists

Initial Medications for Management of Hypertension

Lifestyle Modification—Especially Diet and Exercise

- **Diuretics**
- **ACE Inhibitors or ARBs***
- **Calcium antagonists**
  - B-blockers should be included in the regimen if there is a compelling indication for a B-blocker

---

* Recommended for CKD
  Combining ACEI with ARB discouraged

---

Available evidence does not support use of beta-blockers as first-line drugs in the treatment of hypertension.
Previous guideline recommendations for SBP targets of <140 mmHg, and <150 mmHg if ≥60 years old in JNC 8 have recently been resurrected by the AAFP/ACP!

In most adults – regardless of age and diabetes status – reducing SBP to 130-139 mmHg (if tolerated) appears to offer the best overall organ protection (the “sweet spot”)

In older and other vulnerable patient populations (eg, diabetics), check renal function and electrolytes more regularly if lower targets are used

How you measure BP is a key determinant of target BP
- <140 mmHg (old method)
- <130 mmHg (SPRINT method)
Post-test ARS Question 1

A recent study from Kaiser Permanente reported BP control to <140/90 mmHg in as much as what proportion of patients?

1. 60%
2. 70%
3. 80%
4. 90%
Of the following BP measurements, which demonstrates the lowest correlation with clinical outcomes?

1. Office BP
2. Daytime home BP
3. Nighttime home BP
4. 24-hour BP monitoring
Recently recommended systolic BP targets in various at-risk populations include all of the following, EXCEPT:

1. <150 mmHg
2. <140 mmHg
3. <130 mmHg
4. <120 mmHg
5. <110 mmHg
Post-test ARS Question 4

Which of the following thiazide/thiazide-like diuretics has the shortest half-life?

1. Metolazone
2. Indapamide
3. Chlorothalidone
4. Hydrochlothiazide
According to JNC 8, all of the following antihypertensive drug classes are appropriate for initial treatment of an uncomplicated hypertensive patient, EXCEPT:

1. Beta-blocker
2. ACE inhibitor or ARB
3. Thiazide-type diuretic
4. Calcium channel blocker
Post-test Question 6

Please rate your confidence in incorporating evolving clinical data into your management of patients with Hypertension:

1. Not at all confident
2. Slightly confident
3. Moderately confident
4. Pretty much confident
5. Very confident