A MAP for Improving Blood Pressure Control

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Disclosures

Commercial Interest: None
Objectives

• Describe why prioritizing blood pressure (BP) control is critical
• Explain an evidence-based, practical solution to improve BP control
  • Review the evolution of the AMA’s M.A.P. BP Improvement Program and Target: BP®
  • Apply concepts of M.A.P. in clinical practice
• Q & A
The Importance of Prioritizing BP Control
Improving BP control is critical

2003 JNC 7 definition hypertension (HTN): BP ≥ 140/90 mm Hg
- Prevalence in US adults estimated 34%
- 85.7 million U.S. adults have HTN

2017 ACC/AHA definition HTN: BP ≥ 130/80 mm Hg
- Prevalence in US adults estimated 46%
- 116 million U.S. adults have HTN
Awareness, treatment and control of HTN: NHANES 2011-14
HTN = BP \geq 140/90 \text{ mm Hg} \text{ or on antihypertensive medication}

![Chart showing extent of awareness, treatment, and control of high blood pressure by race/ethnicity (NHANES 2011-2014).](image)

Control is 48.3% using NHANES 2015-2016
Awareness, treatment and control: NHANES 2013-16
HTN = BP ≥ 130/80 mm Hg or on antihypertensive medication

Hypertension is defined in terms of NHANES blood pressure measurements and health interviews. A person was considered to have hypertension if he or she had systolic blood pressure ≥130 mmHg or diastolic blood pressure ≥80 mmHg, if he or she said “yes” to taking antihypertensive medication, or if the person was told on 2 occasions that he or she had hypertension.
NH indicates non-Hispanic, and NHANES, National Health and Nutrition Examination Survey.
Source: National Center for Health Statistics and National Heart, Lung, and Blood Institute.
The AMA Improving Health Outcomes team prioritizes BP Control

- CDC estimates 16 million preventable cardiovascular events will occur from 2017-2022
- The most common modifiable risk factor for cardiovascular events is HTN
- Less than half of all patients with HTN have their BP controlled to goal
Gaps in key interventions to prevent heart disease in U.S. adults

- Adults not using statins when indicated: 39 million
- People with uncontrolled BP: 40 million
- People not taking aspirin as recommended: 9 million
- Adult smokers: 54 million
- Adults who are physically inactive: 71 million

Relative event contributions to preventing a million heart attacks and strokes*

*Notes: Aspirin when appropriate reflects aspirin use for secondary prevention only; total does not equal sum of events prevented by risk factor type as those totals are not mutually exclusive; applies ratios obtained from PRISM and ModelHealth:CVD to estimate the number of total events, to more closely align with the Million Hearts event definition. Data sources: Aspirin when appropriate – 2013-14 NHANES; blood pressure control and cholesterol management – 2011-14 NHANES; smoking cessation and physical inactivity – 2015 NHIS, cardiac rehabilitation – Aedes P, et al. Increasing Cardiac Rehabilitation Participation From 20% to 70%: A Road Map From the Million Hearts Cardiac Rehabilitation Collaboration. Mayo Clin Proc. 2017;92(2):234-242.; sodium reduction – 2011-12 NHANES.
Relative event contributions to preventing a million heart attacks and strokes*

*Notes: Aspirin when appropriate reflects aspirin use for secondary prevention only; total does not equal sum of events prevented by risk factor type as those totals are not mutually exclusive; applies ratios obtained from PRISM and ModelHealth:CVD to estimate the number of total events, to more closely align with the Million Hearts event definition. Data sources: Aspirin when appropriate – 2013-14 NHANES; blood pressure control and cholesterol management – 2011-14 NHANES; smoking cessation and physical inactivity – 2015 NHIS; cardiac rehabilitation – Aedes P, et al. Increasing Cardiac Rehabilitation Participation From 20% to 70%: A Road Map From the Million Hearts Cardiac Rehabilitation Collaboration. Mayo Clin Proc. 2017;92(2):234-242.; sodium reduction – 2011-12 NHANES.
Why prioritizing BP control is critical

Figure 5. Age-adjusted trends in hypertension and controlled hypertension among adults aged 18 and over: United States, 1999–2016

1Significant increasing trend for 1999–2010, p < 0.001.

NOTES: Hypertension estimates are age adjusted by the direct method to the 2000 U.S. Census population using age groups 18–39, 40–64, and 60 and over. Estimates of controlled hypertension are age adjusted by the direct method using computed weights based on the subpopulation of persons with hypertension in the 2007–2008 National Health and Nutrition Examination Survey, using age groups 18–39, 40–64, and 60 and over. Access data table for Figure 5 at https://www.cdc.gov/nchs/data/nhsr/nhsr2018_table.pdf.

The M.A.P. BP Improvement Program
Factors impacting blood pressure control

**Patient factors**
- Non-adherence to treatment
- Lifestyle / Habits
- Lack of support for patients to self-manage HTN
- Social Determinants of Health

**Physician factors**
- Competing priorities/time
- Guideline confusion/complexity
- Don’t use evidence-based treatment protocol
- Diagnostic Inertia
- Therapeutic Inertia

**System factors**
- Inaccurate Blood Pressure (BP) Measurements
  - Lack of standardized measurement protocols, competency testing and retraining
  - Creates uncertainty about reliability of BP
- Not an organizational priority / lack of buy-in

The M.A.P. quality improvement framework

All three are critical for control

We operationalized M.A.P. into a series of easy to follow checklists…

**Increase BP measurement accuracy**
- Incorporate standardized patient positioning
- Use upper arm BP automated measurement devices validated for clinical accuracy and calibrated regularly
- Implement standardized measurement protocol (screen and confirm approach)

**Adopt standardized, evidence-based protocols for treating hypertension**
- Use an evidence-based treatment protocol
- Frequent, follow-up visits until blood pressure is controlled
- Single-pill combination therapy to treat when possible

**Promote patient self-management**
- Incorporate self-measured blood pressure (SMBP) education, tools and resources for patients
- Encourage healthy lifestyle changes to improve BP control
- Assess and address medication and treatment non-adherence
- Use collaborative communication
Each M.A.P. component is implemented for 2 months and includes:

- An evidence-based strategy and action steps
- Supporting tools and resources
- Practice coaching (practice change facilitation)
- Performance metrics, dashboards / monthly reports
- Peer-to-peer learning

...and used the checklists to create The M.A.P. BP Improvement Program, a six-month continuous quality improvement program


Results summary:
- MAP implemented in a residency clinic, 900 hypertensive patients
- Between baseline and the last study visit, BP control to <140/<90 mm Hg increased from 61.2% to 89.9% (p < .0001)
- MAP rapidly and significantly improved hypertension control in medically underserved patients, largely as a result of measuring BP accurately and partnering with patients

https://doi.org/10.1111/jch.13141
M.A.P. Blood Pressure Quality Improvement Program: Positive results

Results summary:
• MAP implemented in 16 practices, 16,000+ hypertensive patients
• BP control improved from 64.4% at baseline to 74.3% (P<0.001) at 6 and 73.6% (P<0.001) at 12 months
• Among adults with uncontrolled baseline BP and no medication changes (n=3654), measure accurately resulted in 11.1/5.1 mm Hg lower BP
• During the first 6 months of MAP, therapeutic inertia fell (52.0% versus 49.5%; P=0.01)
• Systolic BP decreased more per therapeutic intensification (~5.4 to −12.7; P<0.001).
What is Target: BP?

A call to action to prioritize blood pressure control

Recognition for healthcare organizations that who attain high levels of blood pressure control in their patient

A source for tools and resources to use in practice to improve BP control

targetbp.org
Engaging Healthcare Organizations (HCOs) across the United States

Green states indicate our active presence in hypertension engagement.
Components of the M.A.P. BP Program

Measure Accurately

“Accurate and reliable BP measurements are essential for the diagnosis and management of hypertension”
**Measure accurately**

**EVIDENCE-BASED STRATEGY**

Obtain accurate representative BP measurements

**ACTION STEPS**

Perform confirmatory BPs
Repeat high office BP measurements
- Preferably using AOBP
- Correct measurement technique
- Proper number of BP measurements and documentation
- Use validated BP measurement device calibrated regularly
ABPM/SMBP for out-of-office

**KEY AVAILABLE RESOURCES**

- Positioning poster
- Care team BP measurement training tools
- Care team competency tools
- BP measurement audit tool
- SMBP training videos

**METRICS**

**Confirmatory**
- % of patients with high initial BP who have repeat BP documented

**Terminal digit preference zero**
- % of Systolic and Diastolic BP measurements ending in zero

**Blood Pressure Control**
- % adults with hypertension who have BP controlled to less than 140/90 mm Hg (NQF 0018)
## Methods of BP Measurement

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
</table>
| Manual          | - Aneroid devices  
                  - Auscultation                                                             |
| Semi-automated  | - Semi-automated device takes a single reading  
                  - Oscillometry                                                            |
| AOBP*           | - Fully automated device takes multiple readings at a set interval, average reading is used for decision-making  
                  - Oscillometry                                                            |
| ABPM*           | - Ambulatory device worn for 24 hours (or other specified duration), repeated measurements taken – requires interpretation of results  
                  - Oscillometry                                                            |
| SMBP            | - Typically semi-automatic device used to measure BP outside of the office, SMBP is a form of SMBP  
                  - Oscillometry                                                            |

* Preferred method
Semi-automated devices

Automated devices can be an accurate and reliable

Minimize the potential for technique-related errors

Allow for more time to be spent on patient preparation, cuff selection and positioning

Semi-automated devices do not solve the problem of inaccurate BP measurements
Sources of BP Measurement Error

<table>
<thead>
<tr>
<th>PATIENT RELATED</th>
<th>DEVICE RELATED</th>
<th>PROCEDURE RELATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Meal ingestion</td>
<td>9. Device Model Inaccuracy</td>
<td>11. Insufficient rest</td>
</tr>
<tr>
<td>3. Caffeine use</td>
<td></td>
<td>13. Legs crossed</td>
</tr>
<tr>
<td>5. Bladder distension</td>
<td></td>
<td>15. Unsupported arm</td>
</tr>
<tr>
<td>6. Cold Exposure</td>
<td></td>
<td>16. Arm lower than heart</td>
</tr>
<tr>
<td>7. Paretic arm</td>
<td></td>
<td>17. Wrong cuff size</td>
</tr>
<tr>
<td>8. White-coat effect</td>
<td></td>
<td>18. Cuff over clothing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19. Stethoscope under cuff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20. Talking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21. Using bell of stethoscope</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22. Pressure on stethoscope head</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23. Rapid cuff deflation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24. Short interval b/w measurements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25. Reliance on single BP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26. Interarm variability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27. Observer hearing deficit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28. Korotkoff sound interpretation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29. Terminal digit preference</td>
</tr>
</tbody>
</table>

Inaccurate measurement technique is common: a large bias was associated with 27 out of the 29 potential sources.
Impact of seven common errors of BP measurement

<table>
<thead>
<tr>
<th>When the patient has</th>
<th>Blood pressure can change by an estimated*...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossed Legs</td>
<td>2–8 mm Hg&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cuff over clothing</td>
<td>5–50 mm Hg&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cuff too small</td>
<td>2–10 mm Hg&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Full bladder</td>
<td>10 mm Hg&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Talking or active listening</td>
<td>10 mm Hg&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Unsupported arm</td>
<td>10 mm Hg&lt;sup&gt;1,2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Unsupported back/feet</td>
<td>6.5 mm Hg&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

* These values are not cumulative.

2. Handler J. The importance of accurate blood pressure measurement. The Permanente Journal/Summer 2009/Volume 13 No. 3 51
Key Recommendations for Office-Based Blood Pressures

BP Measurement Devices

- Use of automated devices reduces skill required for measuring BP accurately
- Oscillometric devices should be validated for accuracy and calibrated every 1-2 years
- Aneroid devices should be calibrated at regular intervals
- Aneroid devices can be as or more accurate than automated devices with regular device calibration if proper technique used

Measurement Technique

- Training and retraining for all healthcare professionals measuring BP is recommended
- Appropriate patient preparation, positioning and measurement technique required
- Correct number of BPs, documentation, averaging and communication of readings
Fully automated office blood pressure (AOPB)

Monitors can take three BP measurements and average them.

Total measurement time: five minutes.

Provides unattended measurement, minimizing white coat effect.

Correlates well with daytime mean BP on Ambulatory BP monitoring (ABPM).
Confirming In-office BP: Using AOBP in Clinical Practice

AOBP is now the preferred in-office approach for measuring BP

- Canada - Hypertension Canada Guideline 2016 - present

Allows for multiple measurements to be taken at defined intervals and averaged

- Total time required for AOBP is 4 to 6 minutes versus 7 to 8 minutes for auscultatory and semiautomated devices
- Correlates well with 24-hour daytime mean on ABPM

Staff does not need to be present during BP measurement

- Saves staff time
- Reduces or eliminates white-coat effect in most patients

Muntner P, Shimbo D, Carey R et al; on behalf of the American Heart Association Council on Hypertension; Council on Cardiovascular Disease in the Young; Council on Cardiovascular and Stroke Nursing; Council on Cardiovascular Radiology and Intervention; Council on Clinical Cardiology; and Council on Quality of Care and Outcomes Research. Measurement of blood pressure in humans: a scientific statement from the American Heart Association. Hypertension. 2019;71:e***-e***. DOI: 10.1161/HYP.0000000000000087
Confirming In-office BP: Using Out-of-Office Measurements

For confirming the **diagnosis** of hypertension

- 2017 ACC/AHA Hypertension Clinical Practice Guidelines: ABPM should be performed, with SMBP used when ABPM is unavailable or not tolerated
- 2015 USPSTF recommends confirmation of suspected HTN based on in-office BPs by ABPM, and SMBP as an acceptable alternative to ABPM

For the **management** of established **hypertension**

- 2017 Hypertension Clinical Practice Guidelines recommend that SMBP be used to assess control of treated HTN and ABPM performed if confirmatory testing needed

*BPs measured with ABPM and SMBP have a stronger association with CVD risk than office-based BP measurements*

Muntner P, Shimbo D, Carey R et al; on behalf of the American Heart Association Council on Hypertension; Council on Cardiovascular Disease in the Young; Council on Cardiovascular and Stroke Nursing; Council on Cardiovascular Radiology and Intervention; Council on Clinical Cardiology; and Council on Quality of Care and Outcomes Research. Measurement of blood pressure in humans: a scientific statement from the American Heart Association. *Hypertension*. 2019;71:e1–e55. DOI: 10.1161/HYP.0000000000000867
Practical Approach to Measuring Accurately

Measure Initial BP using office-based measurement

CONFIRM elevated office-based measurements with repeat measurements – preferably unattended AOBP if available

Use out-of-office BP measurements whenever possible (ABPM or SMBP)

DIAGNOSE Document appropriate diagnosis and evaluate accordingly
Components of the M.A.P. BP Program

Act Rapidly

To treat confirmed uncontrolled high BP
### Act rapidly

#### EVIDENCE-BASED STRATEGY
- Intensify treatment for confirmed uncontrolled High Blood Pressure

#### ACTION STEPS
**Intensify treatment**
- Use a treatment protocol
- Use single-pill combination therapy
- Increase follow up frequency to every 2-4 weeks until BP is controlled (include outreach)

#### KEY AVAILABLE RESOURCES
- Hypertension treatment protocol
- Therapeutic inertia assessment tool
- Registry reporting listing uncontrolled / overdue patients for outreach and or recall

#### METRICS
- **Therapeutic Intensification**
  - % of patients with uncontrolled BP during an office encounter who are prescribed an additional class of antihypertensive medication
- **Blood Pressure Control**
  - % adults with hypertension who have BP controlled to less than 140/90 mm Hg (NQF 0018)
“Therapeutic inertia” defined

A lack of treatment intensification when a patient’s blood pressure is high

- Treatment intensification includes initiation or escalation of anti-hypertensive medication

Treatment intensification enhances survival and decreases the likelihood of cardiovascular events in people with uncontrolled hypertension
Therapeutic inertia: Contributing factors

**Clinician factors**
- Uncertainty of BP measurement
- Competing priorities (insufficient time)
- Failure to recommend frequent follow-up (4 weeks)
- Delay in diagnosis
- Hesitation to titrate treatment
- Failure to set clear goals and insufficient focus on attainment

**System factors**
- Absence of BP measurement protocol and hypertension treatment protocol
- Lack of HTN registry
- Lack of dashboards or performance reports
- Poor communication between team members
- Lack of prioritization of HTN

**Patient factors**
- Absence of Symptoms
- Medication side effects
- Cost of medications
- Missed follow-up
- Denial of disease & severity
- Mistrust of health care professionals
- Poor communication w/ Provider

Hypertension cascade among non-Hispanic black adults over 18

In 2014, 11.3M AA adults had hypertension

- Controlled: 45.3% (N = 5.1M)
- Uncontrolled: 54.7% (N = 6.2M)

Source: 2013-2016 National Health and Nutrition Examination Survey

Used with Permission from Hilary K Wall, MPH, Sr. Health Scientist and Million Hearts Science Lead, Centers for Disease Control and Prevention, Atlanta GA
Hypertension cascade among non-Hispanic black adults over 18

71.9% of AA adults with uncontrolled HTN are diagnosed, but not treated to goal

Source: 2013-2016 National Health and Nutrition Examination Survey

Used with Permission from Hilary K Wall, MPH, Sr. Health Scientist and Million Hearts Science Lead, Centers for Disease Control and Prevention, Atlanta GA
Standardized treatment protocols

• Having a “playbook” can help guide the entire care team

   *Who* needs treatment
   *What* treatment should be used
   *When* follow-up should occur

Ways to increase adoption:

• Make sure all clinical team members are familiar with the protocol
• Embed into the EHR
• Audit use and provide feedback
AMA’s hypertension medication treatment protocol

For adults without CHF, CAD, pregnancy, CKD stage 3 or albuminuria ≥ 300 mg/d or ≥ 300 mg/g albumin-to-creatinine ratio

- Prescribe dihydropyridine CCB plus ACEI or ARB in a single-pill combination (SPC).
- If concerned about hypotension, frailty in the very old, increased risk of medication intolerance or other factors, consider a low dose SPC or monotherapy with a CCB.

Check labs at clinician’s discretion.

Not on antihypertensive medication

- Prescribe one additional medication from a different class (ACEI or ARB, CCB, or thiazide or thiazide-like diuretic) preferably as a single-pill combination (SPC), if available.

Already on antihypertensive medication

- If CCB not tolerated (e.g., external), consider replacing with thiazide-like diuretic.
- If diabetes with albuminuria and monotherapy desired, use an ACEI or ARB.

Reassess BP in 2–4 weeks

Use self-measured BP (SMBP) if available.

Yes

BP at goal?

No

Reassess BP in 3–6 months

Use SMBP, if available

Assess treatment adherence

Use strategies to optimize, if needed

Intensify medication if benefits outweigh risks

1. If on SPC, increase SPC dose or add thiazide-like or thiazide diuretic.
2. If on CCB monotherapy, add ACEI or ARB preferably as SPC.
3. If on ACEI or ARB monotherapy, add CCB preferably as SPC.
4. If on thiazide-like or thiazide monotherapy, add ACEI or ARB.
5. If on three medication classes, consider referral to specialist and/or adding spironolactone.

This document is not intended as a substitute for the medical advice of a physician; it offers no diagnoses or prescription. No endorsement is implied or intended by the American Medical Association or any third-party organization, product, drug or service.
## Generic medication summary

<table>
<thead>
<tr>
<th>Antihypertensive medication</th>
<th>Sample generic options</th>
<th>Dose once daily (initial)*</th>
<th>Dose once daily (intensified)*</th>
<th>Estimated Cost (30-day supply)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCB and ACEI (SPC)</td>
<td>(a) amiodipine/benazepril</td>
<td>(a) 2.5/10 mg</td>
<td>(a) 5/10 mg or 5/20 mg</td>
<td>$15–20</td>
</tr>
<tr>
<td>(if ACEI not tolerated due to cough, go to next row)</td>
<td>(b) 5/10 mg</td>
<td>(b) 5/20 mg or 10/20 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(c) 5/20 mg</td>
<td>(c) 10/20 mg or 10/40 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCB and ARB (SPC)</td>
<td>(a) amiodipine/olmesartan</td>
<td>(a) 5/20 mg</td>
<td>(a) 5/40 mg or 10/20 mg or 10/40 mg</td>
<td>$29–40</td>
</tr>
<tr>
<td>(if cost is an issue, use CCB monotherapy (amlodipine) and go to next row)</td>
<td>(b) amlodipine/telmisartan</td>
<td>(b) 5/40 mg or 5/80 mg</td>
<td>(b) 5/80 mg or 10/80 mg</td>
<td>$50–60</td>
</tr>
<tr>
<td>Add thiazide-like or thiazide diuretic</td>
<td>(a) indapamide (preferred)</td>
<td>(a) 1.25 mg</td>
<td>(a) 2.5 mg</td>
<td>$4</td>
</tr>
<tr>
<td></td>
<td>(b) chlorthalidone (preferred)</td>
<td>(b) 12.5 mg = ½ 25 mg tab</td>
<td>(b) 25 mg</td>
<td>$8–16</td>
</tr>
<tr>
<td></td>
<td>(c) hydrochlorothiazide</td>
<td>(c) 12.5 mg</td>
<td>(c) 25 mg</td>
<td>$4</td>
</tr>
<tr>
<td>Add spironolactone (optional)</td>
<td>spironolactone</td>
<td>12.5 mg = ½ 25 mg tab</td>
<td>25 mg</td>
<td>$3–$12</td>
</tr>
</tbody>
</table>

* This protocol should not be used in patients with CHF, CAD, pregnancy, CKD stage 3 or albuminuria or ≥ 300 mg/g albumin-to-creatinine ratio or the equivalent in first morning void. Simultaneous use of an ACEI, ARB, and/or renin inhibitor is not recommended.16
Initiating Therapy

- Without compelling clinical indications, the four main classes of drugs (diuretics, CCBs, ACEis, ARBs) are acceptable.

- For African-American patients, long acting CCBs or thiazide-like diuretics have been recommended (alone or in combination) for more than 20 years, yet most do not appear receiving these medication classes as initial treatment.

- Most patients will not be controlled with monotherapy and will need at least two or more medications from different classes to achieve control.
Monotherapy versus Combination Therapy

- Sequential monotherapy is more effective than step-wise dosage increases, but single pill combination is even more effective.

- Half-standard dosing of most antihypertensive medications has 80% of the BP lowering effect of full dosing.
  - BP-lowering effect of three medications taken at half-standard dosing estimated to be about 20/11 mmHg (SBP/DBP) and with less side effects.

- As a result, combinations using two or three drugs at lower doses are preferable to one drug at standard or max dose.

Combination therapy as initial treatment: Gaining momentum

Figure 4 Core drug treatment strategy for uncomplicated hypertension. The core algorithm is also appropriate for most patients with HMOD, cerebrovascular disease, diabetes, or PAD. ACEI = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; CCB = calcium channel blocker; HMOD = hypertension-mediated organ damage; MI = myocardial infarction; o.d. = omni die (every day); PAD = peripheral artery disease.

Conclusion: *Compared with standard-dose monotherapy, initiating treatment with low-to-standard dose dual combination therapy is more efficacious without increasing withdrawals due to adverse events.*
Simplified Treatment Intervention to Control Hypertension (STITCH) trial

- STITCH algorithm included initial therapy with a single pill low dose combination ACEI/diuretic or ARB/diuretic, followed by up-titration
- Randomization occurred in Canadian primary care practices to either use the STITCH algorithm vs the Hypertension Canada Guideline
- Patients treated at practices randomized to STITCH were significantly more likely to reach goal BP at 6 months
  - 64.7% compared 52.7%

Diuretic Options

**Pharmacology of diuretics used to treat hypertension**

<table>
<thead>
<tr>
<th></th>
<th>Bioavailability (%)</th>
<th>Half-life (hours)</th>
<th>Duration of action (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thiazide diuretics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bendroflumethiazide</td>
<td>90</td>
<td>3-4</td>
<td>6-12</td>
</tr>
<tr>
<td>Chlorothiazide</td>
<td>9-36 (dose dependent)</td>
<td>Biphasic: Initially 1-2, then ~12</td>
<td>6-12</td>
</tr>
<tr>
<td>Hydrochlorothiazide</td>
<td>65-75</td>
<td>Biphasic: Initially ~5, then 6-15</td>
<td>6-12</td>
</tr>
<tr>
<td><strong>Thiazide-like diuretics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorthalidone</td>
<td>65</td>
<td>40-60</td>
<td>24-72</td>
</tr>
<tr>
<td>Indapamide</td>
<td>90</td>
<td>Biphasic: Initially ~14, then 25</td>
<td>16-36</td>
</tr>
<tr>
<td>Metolazone</td>
<td>65</td>
<td>6-20</td>
<td>18-25</td>
</tr>
</tbody>
</table>

- Based on an analysis of head-to-head trials, indapamide and chlorthalidone are more potent than HCTZ in lowering systolic blood pressure (indapamide ≈50% more potent than HCTZ).
- Indapamide did not have a detectably greater effect than HCTZ on metabolic adverse effects.

Components of the M.A.P. BP Program

Partner with Patients
### Partner with patients

#### EVIDENCE-BASED STRATEGY

Engage/support patients and their families in self-management of HTN

#### ACTION STEPS

Use shared decision making
- Collaborative communication skills (e.g. open-ended questions and teach back)

Provide healthy lifestyle counseling
- Healthy weight
- DASH Diet (Na, K)
- Physical Activity
- Alcohol in moderation

Use Self-measured BP (SMBP)
- Patient/Staff Training
- EB Protocol
- Validated devices

Improve Tx adherence
- Low cost generic SPC
- Reminders
- Blister packs / Pill boxes

#### KEY AVAILABLE RESOURCES

- Healthy Lifestyle Education Tools
- SMBP Patient training tools/videos
- SMBP Staff training tools
- SMBP Infographic
- SMBP loaner device program information
- SMBP Device Accuracy Check Tools

#### METRICS

**Change in BP after therapeutic intensification**
- Change in SBP in mm Hg at the office visit following after adding a new antihypertensive medication class

**Blood Pressure Control**
- % adults with hypertension who have BP controlled to less than 140/90 mm Hg (NQF 0018)
Importance of patient activation

Engaging patients in self-care can increase adherence to care plans and improve BP control

✓ Incorporate shared-decision making
✓ Promote patient self-management using SMBP
✓ Address medication adherence
✓ Promote healthy lifestyle changes
SMBP helps patients and providers

SMBP monitoring helps patients better self-manage their high blood pressure and allows providers to diagnose and manage hypertension more effectively.

Available resources:

- Training video*
- Infographic*
- SMBP recording logs
- General overview materials for patients

* Available in English and Spanish

https://targetbp.org/tools_downloads/self-measured-blood-pressure-video/
There is no one best method to improve treatment adherence

- **Interventions for intentional non-adherence**
  - Prescribe low cost generic single pill combinations
  - Use discount programs
  - Coordinate Pharmacy Refills
  - Assist with transportation if possible
  - Use collaborative communication and shared decisions

- **Interventions for unintentional non-adherence**
  - Pill boxes
  - Blister Packs
  - Reminders / Alerts (Apps)
Questions

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