Using Evidence-Based Treatment Approaches to Reduce Hypertension Disparities in Primary Care Settings

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Multilevel Influences on Disparities in Hypertension Control

- **Local Community**
  - Income inequality
  - Poverty levels
  - Racial segregation
  - Interpersonal discrimination
  - Crime rates
  - Food availability

- **Provider/Clinical Team**
  - Knowledge of guidelines
  - Awareness of disparities
  - BP measurement skills
  - Patient-centered communication skills
  - Cultural competency
  - Trustworthiness

- **Individual Patient Level**
  - Race
  - Socioeconomic Status
  - Biological effectiveness of medications
  - Adherence to medications/lifestyle
  - Health literacy
  - Health insurance coverage

- **National Health Policy Environment**
  - Medicare reimbursement
  - Health care reform
  - National initiatives

- **State Health Policy Environment**
  - Health care exchanges
  - Medicaid expansion
  - Hospital performance data policies
  - State plans and programs

- **Organization/Practice Setting**
  - Leadership
  - Orientation to quality and equity
  - Clinical decision support
  - Electronic medical records
  - Patient education/care coordination
  - Team functioning

- **Family/Social Support**
  - Family dynamics
  - Family history
  - Financial strain
  - Social networks/peer support

Hypertension Disparities: Where We Are & Where We Need to Be

Knowledge
- Clinical efficacy and effectiveness
- Basic biomedical science

Implementation

Equity
- Improved healthcare quality and population health

Research

Stakeholder Engagement

Dissemination and Translation Initiatives

Sustainability of Approaches
Model of relationships between multilevel factors and intervention targets to enhance outcomes of hypertension in urban African Americans

Intervention targets

- Neighborhood and Community Resources
  - Organizational motivation, resources, staff attributes, & climate
- Patient programs and services & Provider system-level supports
- Ongoing support from family and friends
- Patient education & clinical care
  - Nutritional therapy
  - Pharmacotherapy

Health Care Processes

- Patients
  - Self-monitoring
  - Healthy lifestyle
  - Adherence to meds
  - Participatory communication skills
- Shared decision-making
- Health Professionals
  - Participatory communication skills
  - Technical skills
  - Use of guideline-concordant care

Outcomes

Clinical Outcomes
- BP levels
- BP control
- Lipid levels
- Glycemic control
- Renal function

Quality of Life

Patient Experiences of Care

Equity of Services

Costs
Evidence-Based Treatment Protocols for Hypertension

Simple, evidence-based treatment protocols can have a powerful impact in improving control by:

• Clarifying titration intervals and treatment options
• Expanding the types of staff that can assist in timely follow-up with patients
• Serving as clinical decision support, when embedded in electronic health records, at the point of care so no opportunities are missed to achieve control

http://millionhearts.hhs.gov/resources/protocols.html
A CLINICAL TRIAL OF THE EFFECTS OF DIETARY PATTERNS ON BLOOD PRESSURE

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NATIONAL HYPERTENSION RESEARCH GROUP

Abstract

Background: It is known that obesity, sodium in the diet, and alcohol consumption influence blood pressure. Dietary patterns have been shown to affect blood pressure. This study aimed to evaluate the effects of dietary patterns on blood pressure.

Methods: The study was a randomized controlled trial with participants randomly assigned to one of four dietary patterns: DASH, Mediterranean, Asian, or Western. Blood pressure was measured at baseline and after 6 months.

Results: Participants assigned to the DASH diet showed a significant reduction in blood pressure compared to the other dietary patterns. The Mediterranean diet also showed a trend towards reduced blood pressure.

Conclusions: Dietary patterns can significantly affect blood pressure, with the DASH and Mediterranean diets being particularly effective.

Diabetes Care 30:1939–1903, 2007

End-Digit Preference and the Quality of Blood Pressure Monitoring in Diabetic Adults

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OBJECTIVE — Although tight blood pressure (BP) control is proven to reduce diabetes-related cardiovascular risk, it has been difficult to achieve in practice, perhaps in part because of low-quality monitoring data. We hypothesized that low-quality BP data, reflected in end-digit preference (EDP), remains common in primary care of diabetic adults.

RESEARCH DESIGN AND METHODS — Data were abstracted from the charts of 424 adults with type 2 diabetes seen at 16 academic affiliated clinics from 1999 to 2001. End-digit preference and diastolic BP were taken with automated sphygmomanometers and were extracted and analyzed for EDP for zero was calculated. Associations between EDP and selected patient characteristics were determined using multiple logistic regression.

RESULTS — EDP was highly prevalent in the BP measurements taken by nonphysicians (41.0%) and diastolic BP readings between 0 and 120 (OR ≤0.001). In multivariate analysis, nonphysicians showed greater EDP for systolic BP in older patients (odds ratio [OR] 1.07 per 5 years) and women (OR 1.36 vs. men) and for diastolic BP in African-Americans (OR 1.25 vs. whites) (p < 0.05); physicians showed greater EDP for diastolic BP in those with no hypertension (OR 0.97 per 3 kg/m² increase in BMI, p = 0.02).

CONCLUSIONS — Low-quality BP measurement is common in primary care of diabetic adults. Preventative and technological improvements to BP measurement deserve attention as part of an overall strategy to tighten BP control and reduce cardiovascular risk.

CDC
PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
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Evaluation of the Effectiveness of a Problem-Solving Intervention Addressing Barriers to Cardiovascular Disease Prevention Behaviors in 3 Underserved Neighborhoods

Marcello Franco, MD, PhD, Ana Y. Dier Rios, MD, PhD, Thomas A. Glass, PhD, Benjamin Caballero, MD, PhD, Frederick L. Brunaci, MD, MS

Background: Differential access to healthy foods may contribute to racial and economic health disparities. The availability of healthy foods has rarely been measured in a systematic fashion. This study examined the associations between healthy foods and racial and income neighborhood composition.

Methods: A cross-sectional study was conducted in 2007 to determine differences in the availability of healthy foods across 159 contiguous neighborhoods in Baltimore City and County and in the 220 food stores within them. A healthy food availability index (HFAI) was determined for each store, using a validated instrument ranging from 0 to 27 points. Neighborhood food availability was summarized by the mean HFAI for the stores within the neighborhood. Descriptive analysis and multivariate models were used to examine associations of store type and neighborhood characteristics with healthy food availability.

Results: Percentage of predominantly black neighborhoods and 60% of lower-income neighborhoods were in the lowest tertile of healthy food availability versus 4% and 13%, respectively, in predominantly white and higher-income neighborhoods (p < 0.001). Mean differences in HFAI compared predominantly black neighborhoods to white ones, and lower-income neighborhoods to higher-income neighborhoods, were ~20 and ~8, respectively. Supermarkets in predominantly black and lower-income neighborhoods had lower HFAI scores than supermarkets in predominantly white and higher-income neighborhoods (mean differences ~7 and ~10, respectively). Regression analyses showed that both store type and neighborhood characteristics were independently associated with the HFAI score.

Conclusions: Predominantly black and lower-income neighborhoods have a lower availability of healthy foods than white and higher-income neighborhoods due to the differential placement of stores as well as differential offerings of healthy foods within similar stores. These differences may contribute to racial and economic health disparities.
Patient-Physician Partnership to Improve HBP Adherence (Triple P Study)

- **Design**: RCT, factorial design, conducted 2002-2005
- **Participants**: 42 primary care doctors and 279 patients (60% African American) with high blood pressure
- **Settings**: 15 community-based clinics in Baltimore, MD
- **Programs**: Computer-based communication skills training for doctors; Patient activation by community health workers, 6 contacts (1 in-person, 5 by phone)
- **Goals**: Improve patient participation in decisions, adherence to medications, BP control over 12 months

Supported by the National Heart, Lung, and Blood Institute (R01 HL69403), 2001-2005
Physician Intervention

- Interactive CD-ROM features video of the physician interviewing simulated patient
- Workbook with exercises to guide physician through self-assessment
- Video-glossary of illustrative behaviors
- Administration time: 2 hrs

**Data-gathering**
Using open-ended questions to probe patients’ perspectives

**Educating and counseling**
Providing information in short, clear statements with opportunities for patients to ask questions

**Rapport-building**
Making emotional connections, giving support to patients

**Partnering with patients to share decisions**
Soliciting and listening to patients’ views; using “participatory” strategies to solve problems and resolve differences
Monthly newsletter for all patients

- Featuring Q&A column, recipe exchange, health tips, and reminders
Patient Intervention

Intensive intervention patients only:

- 20-minute pre-visit coaching and 10-minute post-visit debriefing delivered by community health worker (CHW) at 1st clinic visit
- Five telephone follow-ups at 2 wks, 3, 6, 9, and 12 mo
- Photo-novella: dramatic storyline with embedded health messages; comic strip format, 5th grade reading level; 6 issues
Community Health Worker Coaching Sessions

- Help patient to identify key concerns with regard to patient-physician relationship and disease management
- Build patient’s skills in joint decision-making
- Provide reinforcement and support; build confidence
- Topics covered include knowledge and beliefs about health and high blood pressure, treatment (with medications, diet, physical activity, weight loss), smoking cessation, alcohol reduction, stress reduction
Example from photonovella

What kinds of problems are you having?

I don’t have enough money. I can’t do what I have to do because I don’t have a car and cannot afford the bus fare to get to my appointments with you. I am just tired of asking people to take me everywhere.
Main Outcomes and Data Analysis

• **Main outcomes measured over 12 months:**
  – Change in patient ratings of physicians’ participatory decision-making style (PDM)
  – Change in patient involvement in care (PIC)
  – Change in self-reported adherence to medication and lifestyle recommendations
  – Change in SBP, DBP, and BP control

• **Data analysis:** mixed effects regression and logistic regression with generalized estimating equations
Lessons Learned – Triple P Study

- The combined intervention was effective at improving information exchange, participatory decision-making and systolic blood pressure.
- Many physician and patient barriers to completion of training/coaching need to be addressed.
- Optimal “dose” of interventions still unknown.
- Important to incentivize physician participation and build on patients’ existing support networks.
Triple P Study – Tools and Protocols

- http://www.drlisacooper.com/

Our Research Initiatives...

Blacks Receiving Interventions for Depression and Gaining Empowerment (BRIDGE)

PI: Lisa A. Cooper, MD, MPH

The “Parent-Composed Depression Care for African Americans” study, also known as the BRIDGE study (“Blacks Receiving Interventions for Depression and Gaining Empowerment”), was a randomized controlled trial, funded by the Agency for Healthcare Research and Quality. The study included educational programs for 21 clinicians and 132 of their African American patients aimed at improving patient-clinician communication about management of depression, increasing treatment adherence, and reducing ethnic disparities in mental health. The study was conducted from 2003 to 2008.

Patient-Physician Partnership to Improve Blood Pressure Adherence (Triple P Study)

PI: Lisa A. Cooper, MD, MPH
Project ReD CHiP
(Reducing Disparities and Controlling Hypertension in Primary Care)

- **Design**: Pragmatic trial using implementation science and community-engagement methods

- **Participants/Settings**: 43 providers and 62 staff at 6 community-based practices in a large primary care network in Baltimore, Maryland (n=45,357 patients) and 7 comparison sites (n=40,131 patients)

- **Interventions**: multi-level quality improvement strategies to reduce disparities/improve BP control
  - Staff and provider BP measurement training
  - Patient care management
  - Provider education

- **Main outcomes**: implementation and sustainability rates, guideline-concordant care, racial disparities in BP control (from EMR), patient and provider experiences, costs

- **Analysis**: SPC and interrupted time-series

Funded by CPHHD, National Heart, Lung, and Blood Institute, P50HL0105187
## Practice Characteristics

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<th>Clinic Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td><strong>Clinic characteristics</strong></td>
<td></td>
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<tr>
<td>PCP, n</td>
<td>9</td>
<td>11</td>
<td>11</td>
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<td>6</td>
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<td>Patients, n</td>
<td>7,755</td>
<td>4,733</td>
<td>14,887</td>
<td>3,681</td>
<td>5,628</td>
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<td>AA patients, %</td>
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<td>23.3</td>
<td>18.4</td>
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<td>White patients, %</td>
<td>28.0</td>
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<td>68.9</td>
<td>77.7</td>
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<td>2,777</td>
<td>1,493</td>
<td>359</td>
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<td>AA patients with uncontrolled HTN, %</td>
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<td>40.1</td>
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<td>80</td>
<td>4,209</td>
<td>1,362</td>
<td>650</td>
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<td>White patients with uncontrolled HTN, %</td>
<td>29.2</td>
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<td>24.3</td>
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<td>Medically underserved area†</td>
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<td>Yes</td>
<td>Yes</td>
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<td>Median income (in 2011 US $)</td>
<td>$47,472</td>
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<td>$58,488</td>
<td>$50,459</td>
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<td>% below poverty line*</td>
<td>19.0</td>
<td>21.0</td>
<td>8.9</td>
<td>10.6</td>
<td>18.2</td>
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<td>% Employed *</td>
<td>55.5</td>
<td>54.8</td>
<td>70.7</td>
<td>60.3</td>
<td>59.0</td>
<td>64.4</td>
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<td>% Population AA *</td>
<td>71.7</td>
<td>59.1</td>
<td>19.5</td>
<td>16.9</td>
<td>34.1</td>
<td>27.6</td>
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<td>% High school or equivalent*</td>
<td>81.4</td>
<td>76.9</td>
<td>85.6</td>
<td>78.7</td>
<td>78.2</td>
<td>92.7</td>
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<td>Vacant housing units*</td>
<td>16.7</td>
<td>19.6</td>
<td>6.7</td>
<td>10.6</td>
<td>14.5</td>
<td>5.6</td>
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</table>

† by site address
* By zip code tabulation area, American Community Survey, 2007-2011. The zip codes representing the majority of patients at each practice are included.

Abbreviations: AA African American, n number, US United States.
Organizational Measures

- In-depth interviews, focus groups, and surveys of practice administrators, office medical directors, upper level management, frontline clinicians, and medical assistants to measure:
  - Organizational and practice-level functioning
  - Organizational and individual readiness to change
  - Organizational and individual motivation to use QI
  - Organizational and individual cultural competence
  - Local environment, including food availability, crime rates, and neighborhood socioeconomic status for patient receiving care at each clinic
Intervention 1: BP Measurement

- Automated devices provided to all clinics
  - Omron HEM-907XL
- Education of medical assistants (MAs) and clinicians using standardized protocol
- Certification required after training
- Web-based module for new hires and retraining
- Exam room posters to explain the new process to patients
Distribution of blood pressure (BP) measurements taken 24 weeks pre- and post-BP measurement intervention
BPM Intervention Effect on End Digit Preference by MAs and PCPs

Systolic blood pressures from EMR

1st Reading (MA)

![Bar chart showing terminal digit preference for the first reading (MA).]

End digit of SBP measures

Terminal digit zero:
19638/61217 (32.1%) vs. 6835/61796 (11.1%)

2nd Reading (PCP)

![Bar chart showing terminal digit preference for the second reading (PCP).]

End digit of SBP measures

Terminal digit zero:
6221/14039 (44.3%) vs. 1819/4951 (36.7%)
Changes in Blood Pressure Values

- SBP values increased by 0.7 mmHg (P<0.001) at intervention sites and remained unchanged at comparison sites (-0.1 mmHg, P=0.17)
- DBP values decreased by 2.2 mmHg (P<0.001) at intervention sites, while remaining unchanged at comparison sites (-0.1 mmHg, P=0.03)
- The Δ in SBP values associated with the intervention was small, but implementing it would have resulted in 24.2% of African Americans, classified as having uncontrolled HTN prior to the intervention, being reclassified as controlled, while only 14.9% of Whites would have changed categories
- Racial differences in terminal digit preference for SBP and DBP were eliminated after the intervention
Intervention 2: Care Management

• Pharmacist/registered dietitian team at each site uses culturally relevant motivational strategies to encourage:
  – Medication adherence
  – The DASH-low sodium diet
  – Light to moderate physical activity
  – Weight loss
  – Self-monitoring behavior

• Care managers educate patients about HTN and promote lifestyle modification* and use of self-management behaviors

• Community resource guide is provided to patients

• 3 sessions over 3 months (2 hours contact) for patients with uncontrolled BP
Quasi-Experimental Analytics to Assess Care Management Effectiveness

- Difference-in-differences (DID)
  - Accounts for secular trends. “Interaction term” quantifying whether participation in the intervention modified the change in BP which simply occurred over time
- Intervention group: Completed 3 sessions
- Control groups: Completed 1 or 2 sessions; Did not participate
- Pre-Intervention: BP which qualified patient for the program
- Post-Intervention: BP three months after completion of session 1, or three months from median session 1 date for the clinic to which the non-participant belongs
Effectiveness: Systolic Blood Pressure

D.I.D. = 14 mmHg
p = 0.001
Effectiveness: Systolic Blood Pressure

- D.I.D. = 14 mmHg, $p=0.001$
- D.I.D. = 7 mmHg, $p=0.001$
Effectiveness: Systolic BP

D.I.D. = 14 mmHg  
*p* = 0.001

D.I.D. = 7 mmHg  
*p* = 0.001

D.I.D. = 7 mmHg  
*p* = 0.001
Effectiveness: SBP by Race

White D.I.D. = 16 mmHg  
*p=0.001
Effectiveness: SBP by Race

A.A. D.I.D. = 8 mmHg  
*p=0.001

White D.I.D. = 16 mmHg  
*p=0.001

Diagram showing the change in SBP before and after intervention for African Americans and Whites with and without sessions.
Intervention 3: Provider Education

• Dashboard with BP control audit/feedback, stratified by patient race, updated monthly, displayed by quarter

• Educational intervention
  – Web-based program using interactive digital video-media to teach effective communication skills for enhancing medication adherence

• Productivity credits for participation in program
Provider Performance Feedback

- Graphs depict HTN control as % of patients at goal (<140/90)
- Color coded according to the target control ranges set by Maryland for Medicaid value-based purchasing
Percent of HTN Patients at Goal (<140/90) by Race and Provider at Clinic 1

Black Patients
African-American Hypertensive Patients
SITE 1

Data are from July-September 2013

White Patients
White Hypertensive Patients
SITE 1

Data are from July-September 2013
Percent of HTN Patients at Goal (<140/90) by Race and Provider at Clinic 5

Data are from July-September 2013
Welcome to the Project ReDCHiP Communication Skills Training program. Reviewing this program requires about 30 minutes. The program demonstrates communication approaches to address medication adherence among patients with hypertension.

Johns Hopkins Community Physicians will get relative value units (RVUs) for participating in this program. To use this program and get your RVUs, you must follow the 3 steps below:

- Take the required pre-training survey here.
- Choose your path – you can browse the various communication skills under the SKILLS tab, or choose to view the skills applied to a specific patient scenario under the PATIENTS tab.
- After viewing the demonstrations, click on the GET RVUs tab at the top of the page to finish the post-training survey and claim your RVUs.

You can also print a summary of this training for future reference by clicking here.

Meet The Patients. Click the images below.

Mr. Jackson  Mrs. Lewis  Ms. Bass
• **What Worked**
  – BP measurement intervention for staff
  – Care management for patients who came in for it
  – Providing technical support
  – Provider referrals to care management
  – Engaging leaders prior to intervention roll out
  – Regular communication with practice leaders and staff

• **What didn’t**
  – BP measurement intervention for providers
  – Obtaining EMR data in a timely manner
  – Web-based communication skills program for providers
  – The same number of sessions for all patients
  – Outreach by clinic-based care managers
Conclusions

• Our redesigned BPM process was feasible in real-world settings, eliminated terminal digit preference, and reduced the influence of observer bias on office-based BP measurements.

• Two hours of in-person CM provided the support necessary for patients to achieve a clinically significant BP improvement; however, African Americans experienced half the improvement of whites and racial disparities in BP increased.

• Provider education intervention uptake was hampered by changes in the EMR, leadership and provider turnover; and lack of a consistent practice-level process for reviewing clinical performance data and creating actions plans.
Implications

• Staff training can lead to effective and sustainable quality improvement of the BPM process

• The challenge of engaging patients in care management, may threaten its role in “population health management” of highly prevalent conditions

• To reduce disparities, African Americans may need additional sessions, greater support outside the clinic, and/or policies which address social determinants of health

• More leadership involvement and infrastructural support are required for provider engagement in disparities reduction efforts
**The 2015 M.A.P. checklists for improving BP control**

### Measure accurately

**Screening checklist**
- When screening patients for high blood pressure:
  - Use a validated, automated device to measure BP
  - Use the correct cuff size on a bare arm
  - Ensure patient is positioned correctly

**Confirmatory checklist**
- If screening blood pressure is ≥140/90 mm Hg, obtain a confirmatory measurement:
  - Repeat screening steps above
  - Ensure patient has an empty bladder
  - Ensure patient has rested quietly for at least five minutes

- Obtain the average of at least three BP measurements

### Act rapidly

- If a patient has blood pressure ≥140/90 mm Hg confirmed:
  - Use evidence-based protocol to guide treatment
  - Re-assess patient every 2-4 weeks until BP is controlled
  - Whenever possible, prescribe single-pill combination therapy

**Evidence-based protocols typically include**
- Counsel on and reinforce lifestyle modifications
- Ensure early follow-up and add preferred medications in a step-wise fashion, until BP is controlled
- For most patients, give preference to:
  - Thiazide diuretics
  - Dihydropyridine calcium channel blockers
  - ACE inhibitors (ACEI) or
  - Angiotensin receptor blockers (ARB)
- Do not prescribe both ACEI and ARB to same patient
- If BP ≥160/100 mm Hg, start therapy with two medications or a single pill combination

### Partner with patients, families and communities

- To empower patients to control their blood pressure:
  - Engage patients using evidence-based communication strategies
  - Help patients accurately self-measure
  - Direct patients and families to resources that support medication adherence and healthy lifestyles

**Evidence-based communication strategies include**
- Begin with open-ended questions about adherence including recent medication use
- Explore reasons for possible non-adherence or a single pill combination
- Emphasize patient views on options and priorities to customize a care plan for each patient
- Remain non-judgmental at all times
- Use teach-back to ensure understanding of the care plan

**Evidence-based tips for patient self-measurement of BP**
- Instruct patient to measure BP accurately using a validated, automated device and correct positioning for measurement
- Ask patient to record 2-4 morning BP measurements and 2-2 evening BP measurements for 4 consecutive days between office visits
- Develop a systematic approach to ensure patients can act rapidly to address elevated BP readings between office visits
- Counsel patients that self-measured BP ≥135/85 mm Hg is considered elevated

**Evidence-based lifestyle changes to lower BP include**
- Following the DASH diet, which is rich in fruits, vegetables and whole grains; low-fat dairy; poultry, fish and plant-based oils; and limits sodium, sweets, sugary drinks, red meat and saturated fats
- Engaging in moderate physical activity, such as brisk walking, for 40 minutes a day at least four days a week
- Maintaining a healthy body mass index (BMI)
- Limiting alcohol to <2 drinks/day in men, <1 drink/day in women

These checklists are not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Questions?