SMBP – Where We Came From, Where We’re At, and Where We Need to Be

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Centers for Disease Control and Prevention

Wyoming Chronic Disease Conference
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Overview

- Million Hearts® 2022
- Hypertension burden
- What is SMBP?
- SMBP through the years
- SMBP implementation
- Resources, resources, resources
### Million Hearts® 2022 Priorities

#### Keeping People Healthy
- Reduce Sodium Intake
- Decrease Tobacco Use
- Decrease Physical Inactivity

#### Optimizing Care
- **80% target**
  - Improve ABCS*
  - Increase Use of Cardiac Rehab
  - Engage Patients in Heart-healthy Behaviors

#### Improving Outcomes for Priority Populations
- Blacks/African Americans with hypertension
- 35- to 64-year-olds
- People who have had a heart attack or stroke
- People with mental illness or substance use disorders who use tobacco

*Aspirin when appropriate, Blood pressure control, Cholesterol management, Smoking cessation*
Blood pressure control (<140/90 mmHg) among adults aged ≥18 years with hypertension – NHANES 2015-2016

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age Group</th>
<th>Race/Ethnicity</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Total</td>
<td>Total</td>
<td>48.5</td>
</tr>
<tr>
<td>Male</td>
<td>Male</td>
<td>Male</td>
<td>45.2</td>
</tr>
<tr>
<td>Female</td>
<td>Female</td>
<td>Female</td>
<td>51.6</td>
</tr>
<tr>
<td>18-44</td>
<td>18-44</td>
<td>18-44</td>
<td>40.0</td>
</tr>
<tr>
<td>45-64</td>
<td>45-64</td>
<td>45-64</td>
<td>53.8</td>
</tr>
<tr>
<td>≥65</td>
<td>≥65</td>
<td>≥65</td>
<td>45.9</td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>Non-Hispanic white</td>
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<tr>
<td>Non-Hispanic black</td>
<td>Non-Hispanic black</td>
<td>44.3</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic Asian</td>
<td>Non-Hispanic Asian</td>
<td>38.2</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>Hispanic</td>
<td>Hispanic</td>
<td>44.2</td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
<td>Other</td>
<td>46.5</td>
</tr>
</tbody>
</table>

Key: * = p<0.05

What is SMBP?

- Self-Measured Blood Pressure (SMBP) monitoring – the measurement of BP by an individual outside of a clinic setting including at home
- AKA “home blood pressure monitoring”
- SMBP is NOT – BP taken at a pharmacy kiosk, or by a smart phone device, wearable sensor, cuffless BP monitor, or finger cuff
- Evidence-based strategy for lowering BP when combined with clinical support
The Evolution of SMBP
• **1979** – first mention of “home blood pressure monitoring” in PubMed

• **1993** – first(?) automated home BP cuff on market (Panasonic); JNC-5 – “encourage self-monitoring”; first mention of “self-measured blood pressure monitoring” in PubMed

• **1997** – JNC-6 includes 4 sentences on “self-measurement of blood pressure”

• **2001** – first year that ≥10 publications/year on HBPM in PubMed

• **2003** – JNC-7 includes 3 sentences on “self-measurement of BP”
AHA/ASH/PCNA “Call to Action”

• Action plan included making SMBP a part of routine management of hypertensive patients

• Called for reimbursement of monitors and clinician time for training, validation, and interpretation

https://www.ahajournals.org/doi/pdf/10.1161/HYPERTENSIONAHA.107.189010
2012-2013

  – SMBP plus additional support vs. usual care – high strength of evidence for lowering BP

• **Million Hearts** Self-Measured Blood Pressure Monitoring: Action Steps for Public Health Practitioners

• Included as a strategy in “1305” funding announcement

Community Preventive Services Task Force

• Recommends (strong evidence) SMBP monitoring interventions combined with additional support to improve BP outcomes in patients with HBP.

• Additional support may include patient counseling, education, or web-based support.

• Economic evidence indicates that SMBP monitoring interventions are cost-effective when they are used with additional support or within team-based care.

2015 – USPSTF Rec

...recommends obtaining measurements outside of the clinical setting for diagnostic confirmation...ABPM [ambulatory] and HBPM [home] may be used to confirm a diagnosis of hypertension after initial screening.
2016

- **Target:BP** launched – AHA and AMA venture to improve BP control rates through quality improvement


• Most effective in:
  – Those with fewer antihypertensive medications
  – Higher baseline SBP up to 170mmHg

• No differences in efficacy were seen by sex or by most comorbidities

• Co-interventions matter
4.2. Out-of-Office and Self-Monitoring of BP

Recommendation for Out-of-Office and Self-Monitoring of BP

References that support the recommendation are summarized in Online Data Supplement 3 and Systematic Review Report.

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A&lt;sup&gt;SR&lt;/sup&gt;</td>
<td>1. Out-of-office BP measurements are recommended to confirm the diagnosis of hypertension (Table 11) and for titration of BP-lowering medication, in conjunction with telehealth counseling or clinical interventions (1-4).</td>
</tr>
</tbody>
</table>

SR indicates systematic review.

8.3.2. Monitoring Strategies to Improve Control of BP in Patients on Drug Therapy for High BP

Recommendation for Monitoring Strategies to Improve Control of BP in Patients on Drug Therapy for High BP

References that support the recommendation are summarized in Online Data Supplement 29.

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A</td>
<td>1. Follow-up and monitoring after initiation of drug therapy for hypertension control should include systematic strategies to help improve BP, including use of HBPM, team-based care, and telehealth strategies (1-6).</td>
</tr>
</tbody>
</table>
Figure 1. Detection of White Coat Hypertension or Masked Hypertension in Patients Not on Drug Therapy

Office BP: ≥130/80 mm Hg but <160/100 mm Hg after 3 mo trial of lifestyle modification and suspected white coat hypertension

- Daytime ABPM or HBPM
- BP <130/80 mm Hg

- Yes: White Coat Hypertension
  - Lifestyle modification
  - Annual ABPM or HBPM to detect progression (Class IIa)

- No: Hypertension
  - Continue lifestyle modification and start antihypertensive drug therapy (Class IIa)

Office BP: 120–129/<80 mm Hg after 3 mo trial of lifestyle modification and suspected masked hypertension

- Daytime ABPM or HBPM
- BP ≥130/80 mm Hg

- Yes: Masked Hypertension
  - Continue lifestyle modification and start antihypertensive drug therapy (Class IIb)

- No: Elevated BP
  - Lifestyle modification
  - Annual ABPM or ABPM to detect masked hypertension or progression (Class IIb)
<table>
<thead>
<tr>
<th>Guideline</th>
<th>Dx</th>
<th>WCH</th>
<th>MH</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australian</strong> Expert Consensus Statement (2015)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>European</strong> Society of Cardiology/European Society of Hypertension (2018)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Hypertension <strong>Canada</strong> (2018)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Hypertension Cardiovascular Outcome Prevention and Evidence in <strong>Asia</strong> (2017)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Italian</strong> Society of Hypertension (2008)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td><strong>Japanese</strong> Society of Hypertension (2012)</td>
<td>X</td>
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<tr>
<td><strong>Korean</strong> Society of Hypertension (2013)</td>
<td></td>
<td>X</td>
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<td>X</td>
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<tr>
<td>National Institute for Health and Clinical Excellence <strong>UK</strong> (2011)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Taiwan</strong> Society of Cardiology and the Taiwan Hypertension Society (2017)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>The Nat’ll BP and Vascular Dz Advisory Committee, (National Heart Foundation of <strong>Australia</strong>) (2016)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dx = diagnosis; WCH = white coat hypertension; MH = masked hypertension
2019 and Beyond

• AHA/AMA/CDC SMBP Policy Statement – coming soon
• AMA – Validated Device Listing website
• CMCS Informational Bulletin
• CDC-NACDD coverage assessment
Million Hearts® SMBP Coverage and Reimbursement Analysis

- **Purpose:** To assess current coverage and reimbursement of SMBP with clinical support services among private and public payers
- **SMBP devices and services assessed:**
  - Coverage of home blood pressure monitors
  - Reimbursement for clinical support services
- **Payers**
  - 20 commercial insurers with the largest # of covered lives
  - 10 Medicaid Programs (AL, AR, CA, IL, LA, MA, MN, NY, SC, SD), fee-for-service and managed care (where available)
  - 5 of the largest Medicare Advantage insurers and/or plans
- **Summary findings** – September 2019
Strong evidence + inclusion in numerous guidelines + national org support + CPT codes + some coverage = Widespread SMBP Implementation!!

RIGHT????
SMBP Uptake – Patients

• National Health and Nutrition Examination Survey
  o 2009-2010 – 36.6% of adults with HTN using SMBP at least monthly\(^1\)
  o 2011-2014 – 38.7% of adults with HTN using SMBP at least monthly\(^2\)

• Smaller cohort studies report 40-50% prevalence of SMBP\(^3\)-\(^6\) in various forms

• Viera et al. – 35.2% of the patients with HTN reported that their physician had recommended using an SMBP device at home

SMBP Uptake – Clinicians

- 97% of clinicians report using SMBP with patients\(^1\)
- 27.6% of primary care clinics had a written policy for training patients in SMBP\(^2\)
- 36.6% distributed written instructional materials to patients for SMBP\(^2\)
- 48.8% had designated a team member to provide training to patients on SMBP\(^2\)

\(\rightarrow\) DISCONNECT

Common Elements of Successful SMBP Support

- Delivery of intervention by a team of trained health care clinicians
- Regular patient communication of SMBP readings to clinicians
- A patient/clinician ‘feedback loop’
Feedback Loop

Patient

Self-measured blood pressure readings
Lifestyle habits (e.g., smoking, diet, exercise)
Medication side effects and adherence barriers
Insights into variables affecting control of blood pressure

Clinician

Adjustments to medication type and dose to achieve goal blood pressure
Suggestions to achieve lifestyle changes
Actions to sustain or improve adherence
Advice about community resources to assist in controlling blood pressure
# SMBP Roles

<table>
<thead>
<tr>
<th>Must Be Done by a Licensed Clinician</th>
<th>Can Be Done by a Non-licensed Person (e.g., medical assistant, local public health department, community health organization, community health workers)</th>
<th>Must Be Done by Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diagnose hypertension</td>
<td>1. Provide guidance on home blood pressure (BP) monitor selection</td>
<td>1. Take SMBP measurements</td>
</tr>
<tr>
<td>2. Prescribe medication(s)</td>
<td>2. If needed, provide home BP monitor (free or loaned)</td>
<td>2. Take medications as prescribed</td>
</tr>
<tr>
<td>3. Provide SMBP measurement protocol</td>
<td>3. Provide training on using a home BP monitor</td>
<td>3. Make recommended lifestyle modifications</td>
</tr>
<tr>
<td>4. Interpret patient-generated SMBP readings</td>
<td>4. Validate home BP monitor against a more robust machine</td>
<td>4. Convey SMBP measurements to care team</td>
</tr>
<tr>
<td>5. Provide medication titration advice</td>
<td>5. Provide training on capturing and relaying home BP values to care team (e.g., via device memory, patient portal, app, log)</td>
<td>5. Convey side effects to care team</td>
</tr>
<tr>
<td>6. Provide lifestyle modification recommendations</td>
<td>6. Reinforce clinician-directed SMBP measurement protocol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Provide outreach support to patients using SMBP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. Share medication adherence strategies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Provide lifestyle modification education</td>
<td></td>
</tr>
</tbody>
</table>

**Optional Tasks – Can be Done by a Non-licensed Person**

1. Reinforce training on using a home BP monitor
2. Reinforce training on capturing and relaying home BP values to care team (e.g., via device memory, patient portal, app, log)
3. Reinforce knowledge of behaviors that can trigger high blood pressure

Overview:
From Jan 2017 – Jun 2018, nine health centers in KY, MO, and NY designed, tested, and implemented collaborative SMBP care models

Aims:
• Learn how the actions of clinical providers, community organizations, and public health could best be coordinated/aligned to facilitate broader uptake of SMBP
• Increase use of SMBP using collaborative care models
NACHC SMBP Project Results*

1,421 patients with hypertension received recommendations for SMBP

Of those, **795** successfully completed ≥1 cycle of SMBP (2 blood pressure readings AM and PM for at least 3 consecutive days)

308 patients were referred to a community program to support patients’ SMBP efforts and other healthy lifestyle changes

*preliminary results
# SMBP Checklist & Key Questions

## SMBP Scope

<table>
<thead>
<tr>
<th>Who is your target population? (see previous diagram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home BP Monitors</td>
</tr>
<tr>
<td>Will monitors be loaned or provided to keep? OR, will patients be asked to purchase them?</td>
</tr>
<tr>
<td>How many monitors are needed?</td>
</tr>
<tr>
<td>Where will funding for monitors and additional staff time come from?</td>
</tr>
<tr>
<td>Do local insurers cover monitors?</td>
</tr>
<tr>
<td>If loaned, how long may patients keep monitors?</td>
</tr>
<tr>
<td>What controls are in place if patients do not return monitors?</td>
</tr>
<tr>
<td>How are monitors inventoried and managed and where are they physically stored?</td>
</tr>
</tbody>
</table>

## Key SMBP Staff

<table>
<thead>
<tr>
<th>SMBP Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does she/he have the authority, time, and skills to coordinate all aspects of the program? If not, how will you address?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMBP trainers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have enough trainers to be available daily?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMBP Clinical Champion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have a champion for every implementation site?</td>
</tr>
<tr>
<td>Do they have the time to invest to facilitate program success?</td>
</tr>
<tr>
<td>Is he/she open to change and new ideas?</td>
</tr>
<tr>
<td>Is he/she a key influencer to others?</td>
</tr>
</tbody>
</table>

## SMBP Patient Identification/Support Activities

<table>
<thead>
<tr>
<th>Patient Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will patients be identified?</td>
</tr>
<tr>
<td>Registry queries and outreach calls? And/or at the point of care based on selection criteria?</td>
</tr>
<tr>
<td>How will you know if appropriate patients are being identified and offered SMBP?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who on the care team recommends SMBP?</td>
</tr>
<tr>
<td>Who will provide outreach support for SMBP patients?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMBP Training and Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who trains the patient on SMBP?</td>
</tr>
<tr>
<td>How will the patient connect with the SMBP trainer (e.g., warm hand-off, follow-up visit)?</td>
</tr>
<tr>
<td>Is the initial follow-up appointment a telephone encounter or a face-to-face visit?</td>
</tr>
</tbody>
</table>

## SMBP Data Management

<table>
<thead>
<tr>
<th>How will SMBP Data be Recorded, Transmitted, and Managed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will patients record/share data back with the care team?</td>
</tr>
<tr>
<td>Do providers want SMBP averages only or individual BP readings as well?</td>
</tr>
<tr>
<td>Who is responsible for preparing and managing SMBP data?</td>
</tr>
<tr>
<td>Where will staff document SMBP data? EHR? Population health management system? Spreadsheet?</td>
</tr>
</tbody>
</table>

## Community Linkages

<table>
<thead>
<tr>
<th>What role could community partners play to support or optimize the efficiency/capacity of your SMBP efforts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply funds to purchase home BP monitors?</td>
</tr>
<tr>
<td>Provide SMBP trainers?</td>
</tr>
<tr>
<td>Conduct outreach calls?</td>
</tr>
<tr>
<td>Supply SMBP support programs?</td>
</tr>
<tr>
<td>Supply Lifestyle management educators/programs?</td>
</tr>
<tr>
<td>Coordinate or supply transportation resources?</td>
</tr>
<tr>
<td>Coordinate or supply food security resources?</td>
</tr>
</tbody>
</table>

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Staff Resources


• Device Accuracy Test – https://targetbp.org/tools_downloads/device-accuracy-test/

• SMBP Average Calculator – https://targetbp.org/tools_downloads/7-day-recording-log-template/

• Tips for an accurate BP reading – https://targetbp.org/tools_downloads/mbp/
• Automated, oscillatory devices are HIGHLY recommended
  o Blue tooth or Wi-Fi capability, store readings
  o More than one user to allow sharing

• Validated devices
  o Who have the devices been validated with?
  o New U.S. site coming soon

• NO smart phone devices, wearable sensors, cuffless BP monitors, or finger cuffs
Cuff Size

- Proper cuff size

<table>
<thead>
<tr>
<th>Cuff</th>
<th>Arm Circumference (cm)</th>
<th>Bladder Dimension (width x length, cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small adult</td>
<td>22-26</td>
<td>12 x 22</td>
</tr>
<tr>
<td>Adult</td>
<td>27-34</td>
<td>16 x 30</td>
</tr>
<tr>
<td>Large adult</td>
<td>35-44</td>
<td>16 x 36</td>
</tr>
<tr>
<td>Extra-large adult</td>
<td>45-52</td>
<td>16 x 42</td>
</tr>
<tr>
<td>Wrist</td>
<td>&gt;52</td>
<td>n/a</td>
</tr>
</tbody>
</table>

- ≥ Large adult cuff – 54.0% men, 38.4% women with HTN

Cuff Loaner Programs

- **Broad resources**

- **Loaner device agreement** – [https://targetbp.org/tools_downloads/loaner-device-agreement/](https://targetbp.org/tools_downloads/loaner-device-agreement/)

- **Inventory management** – [https://targetbp.org/tools_downloads/inventory-management/](https://targetbp.org/tools_downloads/inventory-management/)


Taking SMBP Readings

- Empty bladder
- No caffeine
- Rest for 5 minutes, seated, back supported
- Legs uncrossed, feet on floor
- Cuff on bare arm (no clothing), arm supported
- Avoid talking, reading, or using electronics during readings
- For SMBP – take before AM BP meds
7 SIMPLE TIPS TO GET AN ACCURATE BLOOD PRESSURE READING

- Use correct cuff size: Cuff too small adds 2-10 mmHg.
- Don't have a conversation: Talking or active listening adds 10 mmHg.
- Empty bladder first: Full bladder adds 10 mmHg.
- Support arm at heart level: Unsupported arm adds 10 mmHg.
- Support back/feet: Unsupported back and feet adds 6 mmHg.
- Keep legs uncrossed: Crossed legs add 2-8 mmHg.
- Put cuff on bare arm: Cuff over clothing adds 5-50 mmHg.

The common positioning errors can result in inaccurate blood pressure measurement. Figures shown are estimates of how improper positioning can potentially impact blood pressure readings.

Sources:

The 7 simple tips for an accurate blood pressure reading was adapted with permission of the American Medical Association and The Johns Hopkins University. The original copyrighted content can be found at https://www.ama-assn.org/ama-johns-hopkins-blood-pressure-resources.

https://targetbp.org/tools_downloads mbp/
Blood Pressure Lounge

• Quiet room connected to the waiting room
• Receptionist asks the person to expose their arm and sit comfortably for 5 minutes and starts timer
• After timer goes off, a medical assistant is called to come and take the blood pressure
Patient Training Resources

How to measure your blood pressure at home

Follow these steps for an accurate blood pressure reading

1 **PREPARE**

- Avoid caffeine, cigarettes and other stimulants 30 minutes before you measure your blood pressure.
- Wait at least 30 minutes after a meal.
- If you’re on blood pressure medication, measure your BP before you take your medication.
- Empty your bladder beforehand.
- Find a quiet space where you can sit comfortably without distraction.

2 **POSITION**

- Put cuff on bare arm, above elbow at mid-arm
- Position arm so cuff is at heart level
- Keep arm supported, palm up, with muscles relaxed
- Sit with legs uncrossed
- Keep feet flat on the floor

3 **MEASURE**

- Rest for five minutes while in position before starting.
- Take two or three measurements, one minute apart.
- Keep your body relaxed and in position during measurements.
- Sit quietly with no distractions during measurements—avoid conversations, TV, phones and other devices.
- Record your measurements when finished.

Clinical SMBP Protocol Example

- 2 measurements in AM, 1 minute apart
- 2 measurements in PM, 1 minute apart
- Optimally for 7 days (28 readings); minimum of 3 days (12 readings)
- Average all SBP and DBP readings
Additional SMBP Resources

• Million Hearts SMBP Webpage – https://millionhearts.hhs.gov/tools-protocols/smbp.html

• NACHC Self-Measurement: How patients and care teams are bringing blood pressure to control – https://www.youtube.com/watch?v=XGO-I59UMDg&feature=youtu.be

Patient Stories

Taking Control of My Blood Pressure: D’Angelo’s Story – https://www.youtube.com/watch?v=VNQQ8ranUZo

Taking Control of My Blood Pressure: Natalia’s Story – https://www.youtube.com/watch?v=malq4KnCESY
Future Work

• More widespread implementation
• Better coverage/reimbursement
• Clinical quality measures with patient-generated data
  • NCQA HEDIS
  • CMS measures
• Interoperable systems for transmitting values and clinical interpretation/advice
Million Hearts® SMBP Forum

- Meets quarterly to facilitate the exchange of SMBP best practices, tools, and resources
- Access materials via the SMBP Healthcare Community
  - Go to [www.healthcarecommunities.org](http://www.healthcarecommunities.org) and log in to your account (free to register)
  - Search for ‘SMBP’ under the ‘Available Communities’ tab
  - Click “Join Community”
- Questions: [MillionHeartsSMBP@nachc.org](mailto:MillionHeartsSMBP@nachc.org)
References of Interest


Questions?

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