

**Self-Measured Blood Pressure Monitoring**

# Self-Measured **Hypertension Control**

# Team Based **Blood Pressure**

# Care **Monitoring** **Plus Clinical Support**

The following is a synthesis of five recent articles on Self-Measured Blood Pressure Monitoring.

### What is already known on this topic?

One in three American adults has high blood pressure (HBP), also known as hypertension, and more than half of those do not have their HBP under control. Uncontrolled HBP is a major risk factor for cardiovascular disease, the leading cause of death in the United States, and is associated with an increased risk of heart attack, stroke, and both heart failure and kidney failure. Improving blood pressure (BP) control to recommended levels reduces the occurrence of these events and prevents unnecessary deaths. Moreover, because of the high rates of HBP in black patients and lower rates of BP control in black and Hispanic patients compared with white patients, improved BP control has the potential to decrease related health disparities.

Many types of interventions to improve BP control have been tested. Recent systematic reviews show strong evidence that effective methods to improve BP control include self-measured blood pressure monitoring (SMBP) plus additional clinical support and empowerment of non-physician clinicians (e.g. pharmacists and nurse practitioners) to manage patients' HBP (Figure 1).

SMBP differs from clinic-based and ambulatory blood pressure monitoring and refers to the regular use of a personal BP measuring device outside of a clinical setting to monitor one's own BP. Previous studies involving pharmacist- or nurse-led SMBP have shown improvements in BP control. However, these interventions may not be applicable for routine practice because of issues such as complex protocols and the use of expensive proprietary software. In addition, there is little evidence for improvement in HBP among low-income and minority populations because of barriers such as monitor cost and lack of clinical guidance.

### What is added by these studies?

The selected studies address previous limitations by exploring cost and access barriers to SMBP, the effectiveness of coordination of care and remote counseling combined with SMBP, and barriers and facilitators to implementing an SMBP intervention in new settings (Table 1).

All of the interventions provided patients with an automated, upper-arm home blood pressure monitor, and three added a pharmacist to the care team and included clinical support in addition to SMBP.

**Table 1. Core components of SMBP interventions**

Author (year)	Study Design (Length of follow-up)	Type of additional support	Team member in addition to Primary physician	Results with SMBP + Support		
				Change in SBP (mmHg)	Change in DBP (mmHg)	% Change in BP control
<b>Angell et al. (2013)</b>	Non-randomized single-subject experimental design (9 months)	None	None	-18.7*	-8.5*	+52.5%*
<b>Magid et al. (2013)</b>	Pragmatic, randomized, controlled trial (6 months)	Web support, pharmacist counseling	Pharmacist	-12.4 (-16.3 to -8.6) <sup>†</sup>	-5.7 (-7.8 to -3.6) <sup>†</sup>	+19% <sup>†</sup>
<b>Margolis et al. (2013)</b>	Cluster randomized clinical trial (12 months)	Telemonitoring, pharmacist counseling	Pharmacist	-9.7 (-13.4 to -6.0)*	-5.1 (-7.4 to -2.8) *	+18 %*
<b>Green et al. (2008); Robins et al. (2013)</b>	Three-group randomized controlled trial (12 months); Qualitative	Secure Web messaging, pharmacist counseling	Pharmacist	-14.2 (-16.0 to -12.4)*	-7.0 (-8.0 to -6.0)*	+25%*

\* Mean change in intervention group compared to baseline.

† Mean change in intervention group compared to usual care control group.

To address patient barriers of cost and access to SMBP, one intervention<sup>1</sup> worked with the New York City Department of Health and Mental Hygiene to collaborate with 20 ambulatory care clinics in predominantly black and Hispanic medically underserved neighborhoods. Their goal was to evaluate the integration of SMBP alone into the routine management of uncontrolled HBP by using existing clinic resources and infrastructure. Clinical staff from multiple disciplines participated in a formal training session, and each site received up to 200 automated upper arm BP monitors to distribute free of charge to eligible patients with HBP.

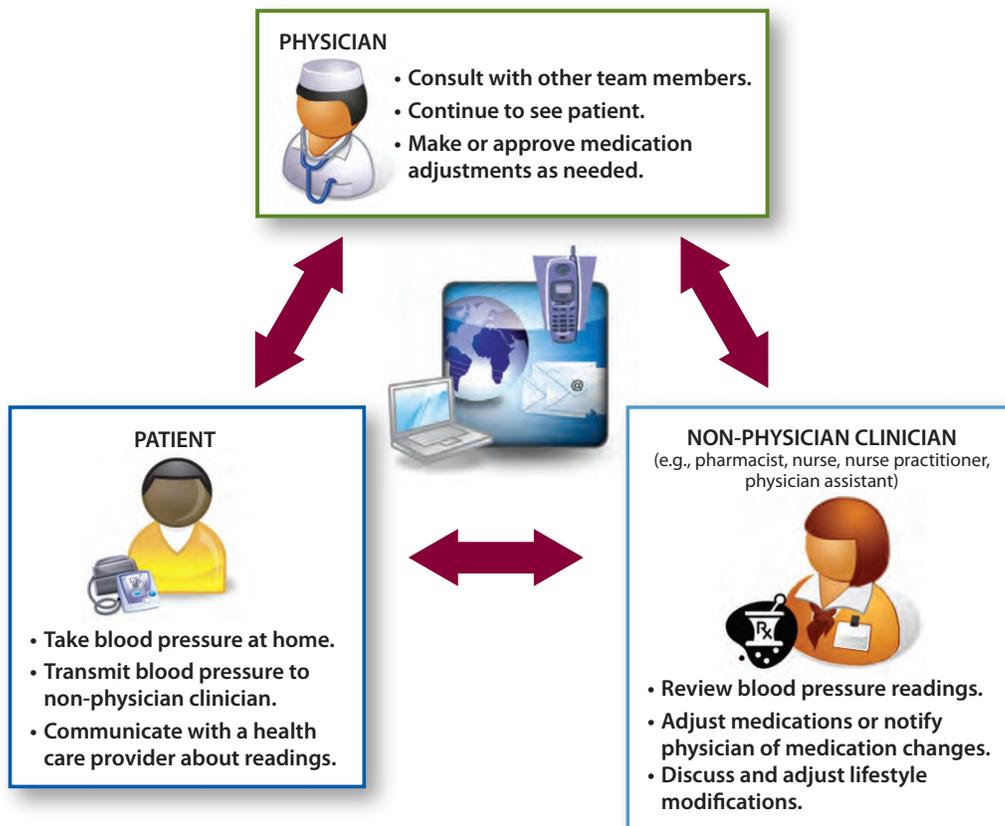
Magid and colleagues,<sup>2</sup> Margolis and colleagues,<sup>3</sup> and Green and colleagues<sup>4</sup> evaluated the effectiveness of pharmacist-led SMBP plus additional clinical support compared with usual care for patients with uncontrolled HBP. Patients met with pharmacists and transmitted BP readings either through the American Heart Association's Heart360 Web-based support tool, a telemonitor, or a secure Web site. Pharmacists reviewed patients' BP medication regimen, provided counseling on lifestyle changes, and adjusted or changed antihypertensive medications as needed, after reviewing SMBP records.

Robins and colleagues<sup>5</sup> conducted an additional qualitative analysis of the clinicians and patients involved in the study

by Green and colleagues<sup>4</sup> to determine the barriers and facilitators of implementing Web-based pharmacist team care in community practice settings. All of the interventions demonstrated a significant improvement in BP control and significant reductions in systolic blood pressure (SBP) and diastolic blood pressure (DBP). In New York, more than half (52.5%) of patients had controlled BP at the 9-month follow-up.<sup>1</sup> Clinicians were generally supportive of the program and reported that use of SMBP showed substantial improvements in BP control. However, most clinics also found it challenging to integrate the program into their standard practices due to difficulties with tracking patients' BP measurements.

In three studies, researchers found significantly better outcomes for the SMBP intervention groups than the usual care groups after a 6- or 12-month follow-up period, including greater BP reductions and better BP control.<sup>2,3,4</sup> Interviews with participants in one study<sup>4</sup> described barriers such as incorporating an unfamiliar pharmacist into the health care team, lack of information technology resources, and provider resistance to using a single BP management protocol. However, other participants named the intervention's perceived potential to improve quality of care, empower patients, and save staff time as positive aspects. Sustainability of the intervention emerged as an overarching concern.<sup>5</sup>

**Figure 1. Diagram of SMBP plus additional clinical support feedback loop (Robins et al.).**



## What are the considerations for public health practice?

- **Providing free BP monitors** removes a significant portion of the cost barrier for patients and clinics.
- **Collaboration** between public health agencies and primary care clinics has great potential to address health disparities through the promotion of effective treatment approaches that could be adapted and disseminated widely.
- **Clinical pharmacists** are well-suited to deliver SMBP interventions because of their experience with and ability to manage medications.
- **The use of electronic health records** may facilitate SMBP integration and lessen the challenge of collecting follow-up data.
- **Patient portals or personal health records** such as the Heart360 Web site provide patients with a simple and efficient way to share BP measurements with clinicians, and obtain educational information and feedback on progress toward reaching BP goals. BP summary reports through Heart360 allow clinicians to focus on medication changes for patients with elevated SMBP readings, and patients with normal SMBP numbers can access graphic displays of their readings.
- Integrated team-based care communications can successfully be delivered using **secure e-mail connected to an electronic health record**.
- Potential mechanisms for **sustainability of interventions** in various clinical settings include
  - » A clinically integrated network (similar to an accountable care organization) which rewards team-based care models that improve quality and efficiency (e.g., remote counseling).
  - » Participation in pay-for-performance initiatives, which financially reward physicians who meet quality targets such as controlled BP rates among patients with HBP.
- **Future research** should focus on finding techniques for using these interventions in other settings and patient populations and evaluating ways to ensure that the interventions are sustainable and cost-effective.

## Additional Resources

Centers for Disease Control and Prevention  
Division for Heart Disease and Stroke Prevention

<http://www.cdc.gov/dhdsp/>

*Select Features of State Pharmacist Collaborative Practice Laws*

[http://www.cdc.gov/dhdsp/pubs/docs/Pharmacist\\_State\\_Law.PDF](http://www.cdc.gov/dhdsp/pubs/docs/Pharmacist_State_Law.PDF)

Agency of Healthcare Research and Quality

*Self-Measured Blood Pressure Monitoring: Comparative Effectiveness*

<http://effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productid=941>

Million Hearts

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

[http://millionhearts.hhs.gov/Docs/MH\\_SMBP.pdf](http://millionhearts.hhs.gov/Docs/MH_SMBP.pdf)

American Heart Association

*Heart360*

[www.heart360.org](http://www.heart360.org)

## Citations

Articles included in this product were all nominated for *Science-in-Briefs* in 2013, with the exception of Green et al.

1. Angell S, Guthartz S, Dalal M, Foster V, Pogue V, Wei A, et al. Integrating self blood pressure monitoring into the routine management of uncontrolled hypertension: translating evidence to practice. *J Clin Hypertens*. 2013;15:180–5.
2. Magid DJ, Olson KL, Billups SJ, Wagner NM, Lyons EE, Kroner BA. A pharmacist-led, American Heart Association Heart360 web-enabled home blood pressure monitoring program. *Circ Cardiovasc Qual Outcomes*. 2013;6(2):157–63.
3. Margolis K, Asche S, Bergdall A. Effect of home blood pressure telemonitoring and pharmacist management on blood pressure control: a cluster randomized clinical trial. *JAMA* 2013;310(1):46–56.
4. Green BB, Cook AJ, Ralston JD, et al. Effectiveness of home blood pressure monitoring, Web communication, and pharmacist care on hypertension control: a randomized controlled trial. *JAMA* 2008;299:2857–67.
5. Robins L, Jackson J, Green B. Barriers and facilitators to evidence-based blood pressure control in community practice. *J Am Board Fam Med*. 2013;26(5):539–57.

*The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.*