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Self-Measured Blood Pressure Organizational Toolkit

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Acknowledgements

We would like to acknowledge the Centers for Disease Control and Prevention, the W.K. Kellogg Foundation, Pritzker Children’s Initiative, and March of Dimes for their support of the Mom and Baby Action Network (M-BAN). We’re immensely thankful to our HRSA Maternal and Child Health Bureau partners for supporting the development of this toolkit.

Portions of the content of this guide were informed, authored, and/or reviewed by a collective group of contributors, which include members of the Mom and Baby Action Network Access to Quality Healthcare workgroup, Kasey Rivas, Simone Snead, Elle Lien Lynch, Kirsten Zook, Sarah Nicholson, Sophia Kecskes, Laney Poye, Chris McGahee, Randy Fillmore, Sindhu Srinivas, Adi Hirshberg, and Caitlin Martinez.

We extend our deepest gratitude to Penn Medicine, Babyscripts, and the Preeclampsia Foundation for their invaluable collaboration, support, and thoughtful review of this toolkit. Your expertise and dedication to improving maternal health outcomes have been instrumental in shaping this resource, and we’re honored to work alongside such committed partners. Together, we’re making significant strides in advancing hypertension management and prenatal care, and we look forward to continued collaboration in our shared mission to improve the health and well-being of moms, babies, and families.

The contents of this toolkit are not a reflection of the endorsement of any single participating organization or company, but rather a collection of best practices, program case studies, and resources.



About the toolkit

This toolkit is designed to support organizations exploring the integration of self-measured blood pressure (SMBP) monitoring into care processes and workflows, specifically for perinatal blood pressure monitoring. The toolkit includes:

- Overview of SMBP
- Levels of SMBP programs
- Case studies
- Cost-benefit analysis
- Overview of common challenges
- Resources

SMBP involves patients regularly measuring their own blood pressure outside of clinical settings using home blood pressure measurement devices. According to the American Medical Association, “having patients measure their own blood pressure at home can improve diagnosis of hypertension, and for those patients who have it, can help get their hypertension under control”.¹ Research indicates that SMBP is a stronger predictor of cardiovascular morbidity and mortality than office-based measurements. The World Health Organization recommends SMBP for managing hypertension in patients with access to the necessary equipment and technology.

This toolkit provides examples of the different levels and types of SMBP programs, case studies, and resources so organizations can learn about and identify the level of SMBP program that may work best to reach their goals in advancing improved maternal health outcomes. We recognize that each organization may not have the same resources available, and hope that this toolkit provides a useful overview with resources to identify what will work for your unique needs.

Audience:

The audience for this toolkit includes clinicians, such as primary care physicians, cardiologists, obstetricians, and nurses, as well as hospital administration and healthcare managers. Additional audience includes public health professionals and community advocates seeking to increase the awareness and adoption of SMBP programs.



Toolkit goals:

1. Promote preventive measures in postpartum care: Educate and guide organizations in prioritizing and implementing SMBP programs to enhance preventive care for postpartum women.
2. Increase adoption of self-measured blood pressure: Amplify the use of SMBP practices among individuals at highest risk for perinatal hypertensive disorders.
3. Support informed healthcare decisions: Enable informed healthcare decisions by increasing the use of blood pressure self-monitoring tools among women.

Challenge overview:

Increased equitable access to quality healthcare during pregnancy and postpartum is essential to ensuring the health and wellbeing of women and children. Equitable access to quality healthcare means having timely use of personal health services

to achieve the best health outcomes. According to the Institute of Medicine (IOM), high quality care should be safe, effective, timely, efficient, equitable, and people centered.² Traditional postpartum care fails to provide the timely care necessary to address hypertensive disorders of pregnancy (HDP).

Postpartum hypertension affects a significant number of women after childbirth and can lead to severe complications if not managed properly. Traditional postpartum care often involves a single follow-up visit six weeks after delivery, which may not be sufficient for detecting and addressing hypertensive conditions as they occur. Studies have shown that traditional in-person follow-up visits often miss early signs of hypertension, whereas continuous monitoring captures these vital signs more effectively.³

As rates of maternal morbidity and mortality increase in the US, recommendations for improvement focus on the importance of antepartum blood pressure goals and surveillance. The American College of Obstetricians and Gynecologists (ACOG) issued guidelines to monitor postpartum blood pressure during two periods after delivery: at 72 hours post-delivery and 7-10 days post-delivery.⁴ Telemedicine and remote blood pressure monitoring interventions during pregnancy and the “fourth trimester” have significant benefits in detecting hypertension and cardiovascular related activities.^{5,6}



In the US, more than 58 million women have hypertension, including almost 1 in 5 women of reproductive age.⁷ According to the CDC, the prevalence of HDP among hospital deliveries affects at least 1 in 7 women.⁸ Stark racial and ethnic disparities exist for Black women as well as American Indian and Alaskan Native women, with HDP affecting more than 1 in 5 and 1 in 6 hospital deliveries respectively.⁸ With the implementation of SMBP monitoring, hypertension can be better detected, monitored, and controlled in women during the perinatal period and throughout their lifespan.

HDP can cause major maternal complications, including heart attack, stroke, peripartum cardiomyopathy, hypertension, type 2 diabetes, cardiovascular disease, and kidney disease.⁹ HDP is the leading cause of pregnancy related morbidity and mortality, but most severe complications and deaths from HDP are preventable with equitable implementation of public health and clinical strategies. Managing HDP is a key strategy for reducing preventable pregnancy related mortality and morbidity in the US.¹⁰

Continuous blood pressure monitoring during pregnancy and the early postpartum period is an evidence-based strategy for women with chronic hypertension and for the early detection of HDP complications. Maintaining a safe blood pressure has been linked to improved maternal health outcomes. SMBP can be used to track a patient’s blood pressure pattern and sharing this information with the clinical team enables early detection of issues and allows for the implementation of a hypertension care plan.

Patient and provider benefits of utilizing SMBP solutions:

- Support collaborative and timely diagnosis and management of HDP
- Increase patient participation in their care
- Provide patients with choices in how their care is delivered
- Enable secure sharing of data between patients and providers
- Ensure enhanced and personalized care for every patient
- Improve health outcomes for patients with HDP

Published meta-analyses have demonstrated that SMBP monitoring with co-interventions such as clinician support, lifestyle counseling, and patient education are associated with improving and reducing blood pressure.¹¹ Technology, communication, and efficient care have become the essential tools to deliver equitable high-quality healthcare for women in the perinatal period and beyond.

**This toolkit uses the term hypertensive disorders of pregnancy (HDP) to include both chronic hypertension and pregnancy-associated hypertension (i.e., gestational hypertension, preeclampsia, eclampsia, and preeclampsia/eclampsia superimposed on chronic hypertension).*

Levels of self-measured blood pressure programs:

We have identified three distinct types or levels of SMBP programs, with descriptions below. Each level includes an overview, case studies, and resource links.

1. [Home-based, non-connected SMBP](#): Patients use blood pressure cuffs at home to measure their blood pressure at regular intervals. SMBP programs typically utilize digital blood pressure cuffs (arm or wrist). The blood pressure cuff might also be accompanied by patient education resources, provider directed BP measurement intervals, BP logs, and instructions for care follow-up.
2. [Telemonitoring SMBP programs](#): Involves the remote transmission of blood pressure readings from patients to healthcare providers. Readings may be delivered via text or cell-enabled/cloud-based delivery directly to electronic health records (EHRs). Providers are able to monitor, adapt hypertension management plans, and alert patients when they should come in for care. Telemonitoring also often includes reminders for patients to record their blood pressure.
3. [mHealth \(mobile health\) apps](#): Mobile applications are designed to help patients track and manage their blood pressure also leveraging virtual/telemonitoring care. These mobile apps allow patients to record and track their blood pressure readings using their smartphones or tablets. Some apps are integrated with EHR's, providing seamless data transmission to healthcare providers. These programs include app-based logging, automated alerts for measurements, educational content, and direct communication with healthcare teams. mHealth is also telemonitoring with additional features built into the mobile applications.

Home-based non-connected SMBP

Home SMBP cuffs that are not integrated into telemonitoring systems offer a practical solution for individuals to monitor their blood pressure independently. With these devices, often paired with educational materials and log books, users can track their health metrics consistently and accurately. There are both manual and digital options, however, digital cuffs are the standard for home use. There are also arm and wrist models, with arm cuffs providing more accurate readings. For the highest benefit, non-integrated SMBP cuffs should be provided to patients with educational materials that include how to use the cuff, understanding BP readings, risk factors, and when to notify your provider. SMBP cuffs are widely available, provide flexibility for the user, and are cost-effective. There are programs that include a validated cuff, educational materials, and log books.

Case study: Preeclampsia Foundation's Cuff Kit™

The Cuff Kit™ is an initiative aimed at improving maternal health outcomes by enabling pregnant and postpartum women to monitor their blood pressure from home. This program, developed in response to the high incidence of hypertension-related complications during pregnancy, provides women with the necessary tools and education to track their blood pressure accurately. The kit includes a validated automatic blood pressure monitor, educational materials on hypertension, and blood pressure tracking logs. These resources are distributed through healthcare providers, including OB-GYNs, community health centers, and nurse home-visiting programs.



The primary goal of the Cuff Kit™ is to enhance self-efficacy among women at high risk for HDP, particularly those who may not have easy access to healthcare due to financial or geographic barriers. By providing these women with the means to monitor their blood pressure at home, the program aims to reduce the incidence of severe complications such as preeclampsia, stroke, and eclampsia, which are significant contributors to maternal morbidity and mortality.¹²

Key components: The Cuff Kit™ is comprised of several key components designed to facilitate effective self-monitoring of blood pressure for pregnant and postpartum women. These components include:

1. **Validated automatic blood pressure monitor:** The core component is a high-quality, validated blood pressure monitor. This device allows women to measure their blood pressure accurately at home, ensuring reliable readings that can be shared with healthcare providers for ongoing monitoring. The monitor used is an arm cuff style digital monitor.
2. **Educational materials:** The kit includes comprehensive educational resources that inform on the use of the monitor and about the signs and symptoms of hypertension and preeclampsia. These materials help women understand the importance of regular blood pressure monitoring and empower them to recognize early warning signs of complications.
3. **Blood pressure tracking logs:** To facilitate consistent monitoring, the kit provides logs where women can record their blood pressure readings. This helps in maintaining a clear record that can be reviewed during medical appointments, enabling better tracking of trends and timely medical interventions.
4. **Reminder bracelets:** These visual aids serve as daily reminders for women to check their blood pressure, particularly in the critical postpartum period when the risk of hypertension-related complications remains high.
5. **Provider integration:** The program encourages integration with healthcare providers, ensuring that the recorded data is communicated effectively and used to inform care plans.
6. **Focus on underserved populations:** The program

focuses on reaching underserved populations who may have limited access to regular prenatal and postpartum care. By distributing these kits through community health centers and other local organizations, the program aims to reduce disparities in maternal health outcomes.

7. **Data collection and research:** The program collects data to assess its effectiveness and to support ongoing research into the benefits of self-measured blood pressure monitoring during pregnancy and postpartum. This research helps in building an evidence base that can advocate for wider adoption of such practices.

Impact and success: The Cuff Kit™ program has had a significant impact on maternal health, particularly in managing and mitigating hypertension-related complications during pregnancy and the postpartum period. One of the key successes of the Cuff Kit Program is its ability to bridge the gap in care that had been exacerbated by the COVID-19 pandemic. With many prenatal visits shifting to telehealth, the ability to monitor blood pressure at home ensures that crucial health metrics are not overlooked. This program has been particularly beneficial for populations that experience higher rates of preeclampsia and related complications, such as Black and Native American women.¹³ The program's success is evident in several key areas:

1. **Improved blood pressure monitoring and management:** The provision of validated automatic blood pressure monitors has enabled women to measure their blood pressure accurately at home. The ability to track blood pressure readings regularly has facilitated women's agency in taking control of their health, leading to better outcomes.¹²
2. **Increased awareness and education:** By educating women on the signs and symptoms of preeclampsia and the importance of regular blood pressure monitoring, the program has helped increase awareness about HDP and in early identification and intervention, reducing the risk of severe complications.¹²
3. **High compliance and engagement:** The simplicity and convenience of the Cuff Kit™ have resulted in high compliance rates among participants. This high level of engagement has translated to improved health outcomes and fewer emergency interventions.¹²

4. **Reaching underserved populations:** By distributing kits through community health centers and local organizations, the program has helped to address healthcare disparities, ensuring that women who may not have easy access to regular prenatal and postpartum care receive the necessary tools and support to monitor their BP.¹²
5. **Recognition and awards:** The program has received significant recognition, including the Hypertension Innovator Award from the US Department of Health and Human Services' Office on Women's Health. This accolade highlights the innovative approach and effectiveness of the Cuff Kit™ in improving maternal health outcomes. The recognition also underscores the program's potential to be a model for similar initiatives aimed at managing hypertension during pregnancy.¹²
6. **Data collection and research contributions:** The program's data collection efforts have provided valuable insights into the effectiveness of SMBP monitoring. This data supports ongoing research and helps build an evidence base advocating for the standardization of SMBP in prenatal and postpartum care. The evidence gathered has shown a clear correlation between regular monitoring and improved health outcomes, reinforcing the importance of such programs in maternal healthcare.¹²

Overall, the Cuff Kit™ program has made substantial strides in improving the management of hypertension during pregnancy and the postpartum period. Through its comprehensive approach that combines self-monitoring tools, education, and focused outreach, the program has successfully enhanced maternal health outcomes and led to reduced incidence of severe hypertensive complications among program participants.

[The Cuff Kit program](#) is recognized as an emerging practice in the Association of Maternal & Child Health Programs (AMCHP) Innovation Hub.

Telemonitoring SMBP programs

Telemonitoring pairs the utilization of home-based SMBP cuffs with direct clinician support. These programs enable patients to measure their blood pressure at home and send the data to healthcare providers via text messages or directly via cell-enabled cloud-connected devices, facilitating continuous monitoring and timely interventions. Studies have shown that these programs lead to higher adherence rates and improved health outcomes by providing a convenient and effective way for patients to engage with their healthcare plan. For example, one trial demonstrated a significant increase in blood pressure measurements obtained from women with HDP compared to traditional office-based follow-ups, highlighting the effectiveness of telemonitoring in capturing vital health data and reducing the risk of complications.¹⁴ Outlined below are two postpartum SMBP program case studies, one text-based program, and one that utilizes a cell-enabled SMBP device. Both programs have demonstrated success in their patient populations. Additional programs and resources are outlined in [APPENDIX A](#).



Case study: Heart Safe Motherhood™

Heart Safe Motherhood™ (HSM) is an innovative text-based telemonitoring postpartum blood pressure program designed and piloted by Penn Medicine. The program was designed to improve maternal health outcomes by focusing on early identification and management of postpartum hypertension. The program leverages digital health technology to ensure that new moms receive timely and effective care, addressing a critical gap in postpartum health monitoring.

Key components: Central to HSM is the emphasis on patient education and engagement to ensure adherence to health monitoring and proactive management of maternal health. This pioneering initiative includes remote blood pressure monitoring through the digital health platform, [Way to Health](#). Key components of the HSM program are listed below:

1. **Remote blood pressure monitoring:** New moms are provided blood pressure cuffs and instructed on how to measure their blood pressure at home. These readings are then sent by text to the healthcare team.
2. **Digital health platform:** The program utilizes a digital health platform to collect and analyze blood pressure data. This platform allows healthcare providers to monitor patients' blood pressure in real-time, identify trends, and intervene promptly if necessary.
3. **Automated alerts and interventions:** If a patient's blood pressure readings indicate potential hypertension, the system automatically generates alerts for both the patient and the healthcare team. This enables immediate clinical intervention, such as medication adjustments or additional consultations, thereby mitigating complications.
4. **Patient education and engagement:** New moms receive comprehensive information about the importance of blood pressure monitoring, the risks of hypertension, and how to manage their health postpartum. This educational component improves adherence to the monitoring protocol and engages patients to take an active role in their healthcare.
5. **Integration with care teams:** HSM is fully integrated with EMR systems and the broader

care teams, including obstetricians, midwives, nurses, and other healthcare professionals who collaborate to provide coordinated care. The integration ensures that issues identified through remote monitoring are addressed promptly and effectively.

Impact and success: HSM has demonstrated significant improvements in maternal health outcomes. Data indicates that HSM has led to increased detection of postpartum hypertension, reduced rates of severe complications, and higher levels of patient satisfaction. By enabling proactive management of hypertension, the program helps prevent the progression to more severe conditions such as preeclampsia or stroke. See the impact of the HSM program below:

1. **Increased detection and management of hypertension**¹⁶

- » The use of remote monitoring has significantly increased the detection of postpartum hypertension.
- » The digital platform enables immediate clinical responses to abnormal blood pressure readings. This has resulted in timely interventions that prevent hypertension progressing to more severe conditions.

2. **Improved maternal health outcomes**¹⁶

- » Patients enrolled in HSM have lower readmission rates for hypertension-related complications compared to those receiving standard postpartum care.
- » Early detection and management of hypertension have led to a decrease in severe complications such as preeclampsia, stroke, and organ damage.

3. **Patient engagement and satisfaction**^{16,17}

- » Data shows that patients are more likely to measure their blood pressure regularly and follow medical advice when they feel supported and engaged through digital health tools.
- » Surveys and feedback indicate that patients appreciate the convenience and reassurance provided by the HSM program.

4. **Data and study results**^{16,17,18}

- » Blood pressure monitoring compliance: In a study conducted by Penn Medicine, it was found that over 80% of participants successfully completed the required blood pressure readings during the postpartum period.
- » Reduction in hypertensive disorders: Clinical data from the program has shown

- » a 25% reduction in the incidence of severe hypertensive disorders among participants.
- » Cost savings: The program has also demonstrated cost-effectiveness by reducing the need for emergency interventions and readmissions leading to lower healthcare costs, benefiting patients, the healthcare system, and insurers.
- » Reduction in racial disparities: A secondary analysis found that the program eliminated the observed racial disparities in postpartum hypertension blood pressure ascertainment. Before the intervention, non-Black women were significantly more likely to attend an in-person blood pressure check than Black women, yet Black women were at higher risk of poor outcomes. With the implementation of HSM, the team saw an increase in their ability to capture blood pressure for all patients, regardless of race.

The success of HSM has set a precedent for the use of digital health technologies in maternal care. The program has served over 23,000 patients and is the standard of care for obstetrics patients at the Hospital of the University of Pennsylvania, Pennsylvania Hospital, Princeton Medical Center, Chester County Hospital, and Lancaster General Health.

The program serves as a model that has been replicated and adapted by healthcare systems aiming to improve postpartum care including Jefferson Health, Washington University in St. Louis, and Woman’s Hospital in Louisiana. Future directions include expanding the program to address other postpartum health issues and integrating additional digital health tools to enhance patient monitoring and care.



Case study: remote postpartum blood pressure monitoring at the University of Pittsburgh

The University of Pittsburgh's telemonitoring postpartum SMBP program at UPMC Magee-Womens Hospital, is designed to manage and mitigate the risks associated with postpartum hypertension. The UPMC Postpartum Hypertension Program is western Pennsylvania's only comprehensive, multidisciplinary service dedicated to treating new moms with pregnancy-related high blood pressure issues.

Key components: The program integrates a multidisciplinary and comprehensive approach to ensure effective postpartum hypertension management and improved long-term cardiovascular health. The key program components include:

- **Comprehensive multidisciplinary approach:** The program fosters collaboration between cardiologists and maternal-fetal medicine specialists. These experts work together to provide holistic care, addressing both immediate postpartum hypertension, and long-term cardiovascular health.
- **Remote monitoring:** Enrolled patients receive cell-enabled digital blood pressure cuffs to use at home. These devices transmit readings to healthcare providers via cloud-based systems. Abnormal readings trigger alerts for immediate medical intervention, if necessary.
- **Patient education and support:** The program includes patient education about the importance of blood pressure monitoring, recognizing symptoms of hypertension, and adhering to medication and lifestyle recommendations.
- **Accessibility and follow-up:** Remote monitoring ensures that patients are consistently tracked, and follow-up visits are facilitated through virtual appointments. The cell-enabled devices improve accessibility by not requiring a cellphone, tablet, or Wi-Fi connected device to communicate BP readings to healthcare providers.

Impact and success: Since its inception, the program has enrolled over 3,000 women and has achieved high patient satisfaction rates. It has notably improved the rate of postpartum checkups by 20%, demonstrating its effectiveness in maintaining continuous patient care.¹⁹ Additionally, the program has received recognition for its innovative approach to maternal health, including the Federal Hypertension Innovator Award from the US Department of Health and Human Services. The success of the remote postpartum blood pressure monitoring program at the University of Pittsburgh is attributed to the following:

1. **Early detection:** Continuous monitoring allows for the early detection of hypertension, reducing the risk of severe complications such as heart attacks and strokes.
2. **Patient agency:** By involving patients in their own care through self-measurement and education, the program facilitates women's agency in taking control of their health.
3. **Scalability:** The program's success in Pittsburgh has led to its expansion to other UPMC locations, including rural areas, helping to address health disparities, and improve maternal health outcomes across diverse populations.
4. **Data and results:**
 - » Improved patient engagement and compliance:¹⁴ The program has achieved high compliance rates, with over 90% of participants reporting at least one blood pressure reading within the first ten days postpartum, 80% continuing beyond three weeks, and 74% continuing beyond four weeks postpartum.

This program at the University of Pittsburgh exemplifies a successful integration of technology and multidisciplinary care in managing postpartum hypertension. Its impact on patient outcomes and its potential for scalability make it a valuable model for improving maternal healthcare.

mHealth apps

Mobile app-based SMBP programs provide a convenient and effective means for continuous monitoring and patient engagement. These programs encourage patients to track their blood pressure in real-time, offering immediate feedback, and fostering a proactive approach to health management by leveraging mobile apps that can be added to smartphones or tablets. The data collected is seamlessly transmitted to healthcare providers, enabling timely interventions and personalized care adjustments. By leveraging the popularity and user-friendly nature of mobile apps, these programs enhance accessibility and support a broader population, ultimately contributing to better overall health and reduced healthcare costs.

Case study: Babyscripts myJourney digital companion and Blood Pressure RPM

Babyscripts myJourney is a patient-centered, clinically supported maternity care program that educates and engages pregnant and postpartum women. The program offers digital education, risk assessments, and intelligent remote patient monitoring via a mobile app and connected devices, with care management services for high-risk pregnancies.

Patient users download the Babyscripts myJourney digital companion app onto their smartphone, enabling 24/7 access to personalized educational content tailored to each stage of pregnancy up through one year postpartum. Through myJourney's assessment and survey functionality, users self-report health history, mental risk, and social determinants of health data. All data is communicated back to the healthcare team through a provider-facing dashboard, enabling the appropriate intervention and facilitating better clinical decision-making.

All users also have access to manual blood pressure tracking in the app, even those who are normotensive or considered low risk, to support the integration of SMBP monitoring into routine prenatal and postpartum care. Patients can input BP data manually or automatically into the myJourney app via a manual or internet-connected cuff. Data is available to the healthcare

team through a provider-facing dashboard and high-risk situations are actively communicated to the patient's healthcare team, enabling recognition of hypertension risk when it occurs and informing any necessary changes to the care plan, including the option to enroll patients onto Babyscripts myJourney Blood Pressure RPM.

Babyscripts myJourney Blood Pressure RPM is specifically designed for high-risk patients and is supported by a care management layer.

Patients track their blood pressure readings at home with the support of a dedicated care manager. Readings are recorded via the myJourney app and an internet or cellular-enabled blood pressure cuff, synced with their healthcare provider's system. This integration allows for continuous monitoring and immediate feedback. If a patient's blood pressure reading is outside of the parameters set by their healthcare team, the app alerts the patient, care manager, and the healthcare team, facilitating timely medical intervention.



Key components: Babyscripts myJourney Blood Pressure RPM incorporates several key components designed to enhance maternal health outcomes through remote monitoring and patient engagement, including the following:

- **Connected blood pressure cuff:** The program provides patients with a digital blood pressure monitor that is internet or cellular-enabled, allowing patients to measure their blood pressure at home and automatically transmit the readings to their healthcare providers in real-time.
- **Mobile app integration:** The Babyscripts myJourney app integrates seamlessly with the blood pressure cuff, allowing users to easily log and track their readings. The app is accessible on both smartphones and tablets.
- **Real-time alerts and feedback:** The app is programmed to send immediate alerts to patients, care manager, and healthcare providers if any readings fall outside of the parameters set by the healthcare team. By means of a sophisticated exception reporting workflow and the addition of care management support, Babyscripts reduces trigger fatigue, surfacing only actionable data.
- **Care management:** Patients enrolled onto Babyscripts BP RPM are matched with a care manager, who operates incident to and under the supervision of the healthcare provider to provide education, motivation, and remove any barriers to compliance with daily blood pressure capture.
- **Tailored educational content:** In addition to general pregnancy and postpartum content, patients enrolled in Babyscripts Blood Pressure RPM receive resources specific to their risk profile.
- **Provider dashboard:** Healthcare providers have access to a dedicated dashboard where they can monitor their patients' blood pressure readings, track trends over time, and adjust care plans accordingly. This centralized data collection facilitates better patient management and follow-up care.
- **Patient engagement and compliance tools:** The app includes tools to help patients stay engaged and compliant with their monitoring routines. This includes reminders for taking blood pressure readings, educational materials, and motivational content to encourage adherence. The patient's care manager communicates

regularly to ensure compliance.

- **Data security and privacy:** The platform complies with all relevant healthcare regulations and standards, including HIPAA, to protect patient information.
- **EMR integration:** Babyscripts BP RPM integrates into the medical record through several methods, enabling patient onboarding directly in the EMR and automatically filling blood pressure readings into the patient's chart.

Together these components provide a comprehensive solution for managing hypertension in pregnant and postpartum women, significantly improving maternal health outcomes by enabling continuous monitoring and timely medical interventions. The Babyscripts blood pressure RPM model is reimbursable, offering a sustainable service for providers to improve the patient experience and outcomes related to hypertension during pregnancy.

Impact and success: Continuous BP monitoring through Babyscripts RPM has demonstrated clinical success in reducing poor outcomes related to hypertensive disorders of pregnancy (HDP). The program's impact is evident in several key areas:

1. **Early detection and management of hypertension:** Use of Babyscripts BP RPM supports the early detection of hypertension, enabling timely medical interventions and preventing the escalation of hypertension into more severe conditions. A study conducted between 2017 – 2020 with Cone Health found a 13-day reduction in the time to detect preeclampsia for patients on Babyscripts compared to non-Babyscripts users (74% Medicaid and 52% Black).
2. **Increase in BP ascertainment:** The results of a randomized control trial (RCT) published in the Green Journal show that use of Babyscripts BP RPM increased postpartum BP ascertainment within 10 days of discharge for women with HDP. Patients using remote monitoring via Babyscripts had higher rates of postpartum BP ascertainment compared with in-office surveillance (91.7% [n=88] vs 58.4% [59]).
3. **Reduction in racial disparities:** The results of the RCT referenced above show the potential of Babyscripts BP RPM to promote health equity. When stratifying the primary outcome by race

and randomization group, Black patients had lower rates of blood pressure ascertainment than White patients when assigned to in-office surveillance (41.2% [n=14] vs 69.5% [n=41], but there was no difference in the remote management group (92.9% [n=26] vs 92.9% [n=52]).

4. **Improved postpartum visit attendance and sustained patient engagement:** The use of Babyscripts BP RPM has been shown to increase patient engagement and rates of postpartum visit attendance. According to data released by LCMC Health, patients enrolled onto Babyscripts were more than twice as likely to attend a postpartum visit within the first 30 days and nearly 40% more likely to attend one within 60 days. Patients demonstrated sustained compliance with Babyscripts BP RPM, allowing providers to capture more than four times the amount of data collected in a traditional office setting.
5. **Improved postpartum assessment of HDP and sustained patient engagement:** Research published in The American Journal of Maternal/Child Nursing demonstrates that remote monitoring through Babyscripts BP RPM results in high levels of patient engagement and has the potential to identify those at risk of severe complications from hypertensive disorders of pregnancy (HDP) in postpartum. Over a five-year timespan, 1,260 patients were enrolled in Babyscripts BP RPM. Of those enrolled, 74% were highly engaged with monitoring, entering seven or more blood pressures. Of those who entered at least one blood pressure, 9% entered at least one critical range blood pressure.

Babyscripts myJourney Blood Pressure RPM serves as a model for leveraging mHealth technologies to improve maternal care. Its success highlights the potential for expanding the program to address other prenatal and postpartum health issues and integrating additional digital health tools to enhance patient monitoring and care.

Case study: Naima Health MyHealthyPregnancy (MHP) app

Naima Health's MHP is a comprehensive health management platform that integrates various health monitoring technologies, including a SMBP component. This platform is designed to support patient's autonomy in taking proactive control of their health through accessible and user-

friendly tools. MHP provides users with a holistic approach to managing their health by leveraging advanced technology and data analytics. The platform encompasses several key features aimed at promoting overall well-being and early disease detection. MHP is available only by prescription and is EPIC integrated.



Key components: The SMBP component of MHP allows users to monitor their blood pressure levels conveniently and accurately from home or any preferred location. This feature is particularly beneficial for individuals with hypertension or those at risk of developing cardiovascular conditions. Here's an overview of key components:

1. **Accuracy and convenience:** Users can measure their blood pressure using compatible devices such as smart blood pressure monitors or wearable health trackers. These devices sync with the Naima Health MHP app, ensuring accurate recording and tracking of blood pressure readings over time.
2. **Data integration and analysis:** The platform aggregates and analyzes blood pressure data along with other health metrics, providing users with insights into trends and patterns. This data-driven approach helps in identifying fluctuations or abnormalities early, prompting timely intervention or consultation with healthcare providers.
3. **Personalized health recommendations:** Based on the collected data and user profiles, Naima Health offers personalized health recommendations. These may include lifestyle modifications, medication adherence reminders, or notifications for follow-up consultations with healthcare professionals.

4. **Educational resources:** The platform also provides tailored educational content about hypertension management, the importance of regular blood pressure monitoring, and strategies for maintaining cardiovascular health.
5. **Integration with healthcare providers:** The app facilitates seamless communication between users and their healthcare providers. Users can share their blood pressure data securely with doctors, enabling remote monitoring and adjustment of treatment plans as necessary.
6. **User interface and experience:** The MHP app features a user-friendly interface that simplifies the process of monitoring and understanding blood pressure data. Graphical representations and trend analysis tools make it easy for users to interpret their health metrics.

Postpartum compliance with health monitoring, particularly through platforms like Naima Health's MHP, focuses on ensuring new moms can effectively manage their health during this critical period. Naima Health recognizes the unique needs of postpartum women, providing tailored support to promote recovery and overall well-being after childbirth. The platform offers various tools and features that facilitate compliance with postpartum health monitoring:

1. **Personalized health goals and reminders**
 - » The MHP app allows users to set personalized health goals and monitoring schedules. For postpartum women, this could include tracking vital signs, mood changes, weight fluctuations, and recovery progress.
 - » To maintain consistency in health monitoring and adherence, the platform sends timely reminders for health checks, medication schedules, doctor appointments, and other essential postpartum care tasks.
2. **Remote monitoring and secure data**
 - » Users can connect wearable health trackers or smart devices to monitor vital signs and physical activity levels. This integration enables real-time data collection and analysis, facilitating remote monitoring by healthcare providers.
 - » Naima Health ensures secure data sharing between users and their healthcare team.
3. **Educational resources and supportive content**
 - » The platform offers educational resources tailored to postpartum recovery, covering topics such as nutrition, breastfeeding

- support, emotional health, and exercise recommendations.
 - » Naima Health may feature forums or peer support groups where postpartum women can connect with others facing similar challenges. This community aspect provides emotional support and practical insights into managing postpartum health concerns.
4. **Telehealth and consultation services**
 - » Users can schedule virtual appointments with healthcare professionals through the Naima Health platform. This feature is particularly beneficial for postpartum women who may prefer or require remote access to medical advice and follow-up care.
 - » The platform includes features to track medication adherence postpartum, ensuring women stay compliant with prescribed treatments and recovery plans.

Naima Health MHP provides a comprehensive solution for individuals seeking to manage their health proactively, with a specific focus on cardiovascular wellness through its SMBP component. By combining advanced technology with personalized insights and educational resources, the platform supports user's autonomy in making informed decisions about their health and well-being. This holistic approach not only enhances user engagement but also contributes to improved health outcomes and quality of life.

Cost benefit considerations

The annual costs associated with high blood pressure, in the general population, are \$79 billion.²⁰ With an increase in the prevalence of hypertension in the population in recent years, and increasing health disparities, an immediate and evidence-based solution is critical to mitigate poor health outcomes and climbing healthcare costs. HDP can lead to lifelong cardiovascular conditions requiring increased medical costs and demands on the healthcare system when compared to someone who has not experienced complications from HDP. SMBP programs have proven to be a successful solution to this growing problem.

As organizations, insurers, and providers are exploring SMBP programs, the cost to implement is a key consideration. Costs will vary depending on the scope and program type, the target population, and level of technology integration. A systematic review of 16 at-home SMBP studies found that at home self-monitoring was the most cost-effective strategy for measuring and managing patients with hypertension, and most cost-effective when combined with additional support or team-based care²¹ such as telemonitoring.

When used with other approaches, SMBP monitoring has a median cost of \$2,800 to \$10,800 per quality-adjusted life year gained.²² A 2014 cost-benefit analysis showed that insurers could realize a return on investment ranging from \$0.85 to \$3.75 per dollar invested in the first year and from \$7.50 to \$19.34 per dollar invested over a ten-year period.²³ Investments in SMBP programs would result in a high long-term cost-benefit.

Key cost factors when considering SMBP implementation include:

1. Equipment costs
2. Training and education
3. Data management and software
4. Program support personnel
5. Patient communication
6. Infrastructure and facility costs
7. Quality assurance compliance
8. Data security and privacy
9. Evaluation and outcome assessment
10. Scaling and sustainability

While considering costs, the benefits such as improved health outcomes and reduced healthcare costs in the long term should also be taken into account.

Key benefits of a SMBP program may include:

1. Improved blood pressure control
2. Reduced healthcare costs
3. Enhanced patient engagement
4. Early detection of hypertension
5. Personalized treatment plans



Challenges

Self-monitoring blood pressure programs can be a valuable tool for clinicians and for pregnant and postpartum people with hypertension, however there are challenges and barriers to consider before implementing a program. Key barriers at the policy and health systems level are well documented and include affordability, SMBP device coverage and reimbursement for services, data transfer and privacy protection requirements, broadband access and availability, properly sized equipment, patient connection fees, and EHR limitations.^{24,25} These limitations can make it difficult for clinics to not just implement an effective SMBP program but ensure its sustainability beyond initial investments.

Some recent updates and changes to standard data collection and reporting may alleviate some challenges. One example includes the addition of average blood pressure in the [United States Core Data for Interoperability version 4 \(USCDIv4\)](#) as a data class to be included in EHR systems, which will remove some of the current reporting and financial barriers.

As of 2023, 42 state Medicaid plans cover blood pressure device costs, and 25 state Medicaid plans include provider reimbursement coverage for clinical support services including patient education.²⁶ This is an increase from 38 states and 21 states respectively in 2022 which has the potential to help an additional 1.4 million Medicaid beneficiaries with hypertension.²⁷ The amount and type of services and equipment covered [varies by state](#). Currently, there's no policy explicitly surrounding remote patient monitoring.



In addition to policy and health system barriers, clinician and user level challenges also exist including the following:

1. **Patient compliance:** Consistent and accurate measurement is key to ensuring the effectiveness and value of any SMBP program. When tracking blood pressure trends over time, it's essential for users to maintain a regular monitoring routine. Several barriers such as life distractions, forgetfulness, and lack of motivation can limit the program's effectiveness and lead to misinterpretation of blood pressure levels.
2. **Measurement accuracy:** Accurate measurements are integral for effective monitoring. Several challenges exist for users when obtaining measurements such as proper cuff positioning, maintaining proper posture, and adhering to recommended rest period prior to measurement. Training in the use and proper technique is critical in obtaining accurate readings and blood pressure management.
3. **User education and interpretation:** Depending on the type of SMBP program implemented, user interpretation can play a key role in program effectiveness. Blood pressure readings can be difficult to interpret without medical training and recognizing when to seek medical attention can pose significant challenges. Without proper education and guidance, users may misinterpret their readings, leading to unnecessary anxiety or delayed intervention.
4. **Technology reliability:** SMBP programs often rely on electronic devices, such as home blood pressure monitors and mobile apps. The accuracy and reliability of these devices and technology can vary. Users may experience technical issues, such as device malfunction, incorrect calibration, or connectivity problems with mobile apps, which can impact program effectiveness.

Clinician and user level challenges can be addressed with a combination of user education, clear guidelines for measurement technique, reliable devices, user-friendly interfaces, and, ideally, access to healthcare professionals for guidance and interpretation of readings.

Making an impact

Supporting the implementation of a Self-Measured Blood Pressure (SMBP) program in vulnerable communities, particularly those lacking sufficient funding, requires a strategic approach that maximizes existing resources and partnerships. First, leveraging community-based organizations, clinics, and local public health agencies can provide a foundation for the program without requiring significant initial investment. These institutions often have a deep understanding of the community's needs and can offer physical spaces, staff, or outreach capabilities. A key step is training community health workers (CHWs) to assist with program delivery, as they can provide culturally sensitive care and education on SMBP and risks associated with hypertensive disorders of pregnancy. These workers can act as liaisons between healthcare systems and the populations they serve, ensuring that SMBP is effectively integrated into local health practices without overwhelming the system.

Second, partnerships with larger healthcare institutions, nonprofits, or academic institutions could provide the necessary technical and financial support. Collaborating with these entities opens the possibility for grant funding, research collaborations, and donation of equipment such as blood pressure cuffs and digital monitors. Nonprofits or organizations focused on health disparities may also provide technical training or mobile health units to reach underserved populations. Telehealth platforms, already being increasingly adopted due to the pandemic, can be optimized to deliver SMBP guidance and follow-ups without the need for in-person visits, further reducing costs while expanding access.



Finally, advocating for policy changes at local or state levels is critical for long-term sustainability. Community leaders, healthcare providers, and patient advocates should work together to push for funding allocations toward preventive health programs like SMBP, highlighting the cost savings and improved outcomes these initiatives can generate. Even modest state or local government grants can cover essential components such as CHW stipends, data tracking systems, and equipment. Building a coalition to demonstrate the long-term benefits of SMBP in reducing hospital admissions and improving hypertension management can help make the case, securing future investments, and mobilizing health system champions.



Call to action

The time to act on implementing Self-Measured Blood Pressure programs is now.

- Hypertension remains one of the leading causes of heart disease and stroke, and many communities—especially underserved and vulnerable populations—struggle with access to adequate healthcare for managing this condition.
- SMBP programs offer a proven, cost-effective solution that facilitates individual's agency in taking control of their health, reduces hospital visits, and significantly improves hypertension management.
- Integrating SMBP into our healthcare systems can enhance patient outcomes while reducing the financial burden on individuals and the healthcare system at large.



Healthcare providers and community leaders must **advocate for the integration of SMBP into routine care**, particularly in primary care settings and public health programs.

- SMBP is easy to implement, and with the right training, healthcare providers can guide patients on how to monitor their blood pressure at home, leading to better long-term management.
- Incorporating SMBP into care models provides patients with the tools to track their health in real time and receive immediate feedback from their healthcare teams, fostering a deeper sense of responsibility and engagement in their care.

Organizations, nonprofits, and healthcare providers, the call to action is clear: **form partnerships and seek out funding opportunities** to make SMBP available to all communities, especially those most in need.

- Working together, healthcare institutions, public health departments, community health organizations, and telehealth platforms can combine resources to deliver cost-effective SMBP programs.
- Seeking funding through grants, public health initiatives, or private foundations, and by training community health workers and clinicians to implement SMBP can create sustainable programs that reduce disparities in hypertension care.

Policymakers **must prioritize funding, coverage, and support for SMBP programs.**

- Advocate at the local, state, and federal levels is essential to secure the financial backing and regulatory frameworks necessary for widespread SMBP adoption.
- Advocate for Medicaid and insurance reimbursement for blood pressure monitoring devices and the services associated with SMBP.

Let's act now to prioritize preventive care, improve health outcomes, and reduce healthcare costs by making SMBP programs available to everyone who needs them.

APPENDIX A: SMBP program overview

Program	Type	Device used	Data integration (app-based, EMR, manual entry)	Health professional involvement	Patient education	Additional features / support
Preeclampsia Foundation Cuff Kit™	Home monitoring	Cuff, Digital	Manual, logs	Distribution of cuffs and education, and review of logs	Comprehensive educational resources	Reminder bracelets, focus on underserved communities, program level data collection.
Heartsafe Motherhood™	Text-based monitoring	Cuff, Digital	Readings sent via text integrated into EMR	Auto-generated alerts, telemonitoring by care team	Comprehensive educational resources	Ongoing educational text messages.
UPMC Remote Blood Pressure Monitoring Program	Telemonitoring	Cell-enabled cuff, Digital	EMR	Auto-generated alerts, telemonitoring by care team	Comprehensive educational resources	Patients can schedule virtual consultations with healthcare team to review health status.
Babyscripts my Journey Digital Companion & Blood Pressure RMP	mHealth app	Cell-enabled cuff, Digital	EMR	Auto-generated alerts, telemonitoring by care team	Tailored educational resources	App alerts for compliance and motivation. Includes general pregnancy and postpartum education tailored to their risk profile.
Naima Health MyHealthyPregnancy (MHP) App	mHealth app	Bluetooth-enabled cuff	EMR (Epic)	Auto-generated alerts, telemonitoring by care team	Tailored educational resources	Risk predictive models analyze data to provide early warning signs of health issues including preeclampsia.
Boston Medical Center - Remote Cloud-Connected Postpartum BP Monitoring Program	Telemonitoring	Cell-enabled cuff, Digital	Cloud-based platform, EMR	Auto-generated alerts, integrated into Epic workflows, telemonitoring by care team	Comprehensive educational resources	Leverages a collaborative care team for risk management.
The Journey Pregnancy by Emagine Solutions Technology	mHealth app	Bluetooth-enabled cuff	EMR	Auto-generated alerts, telemonitoring by care team	Comprehensive educational resources	Set goals and alerts in the app. Comprehensive pregnancy education and monitoring.
Ouma Health	Telemonitoring	Cell-enabled or bluetooth enabled cuff	Cloud-based platform, EMR	Medical support through platform and telemonitoring by MFM care team	Tailored educational resources	Personalized care plans, nutrition and wellness support, and virtual check-ins.
Moms2B	mHealth app	Bluetooth-enabled cuffs	Cloud-based platform, EMR	Auto-generated alerts to patient and provider, supported by care team	Culturally tailored education and support resources	Culturally tailored support and social support.
CommonSpirit Health Perinatal Care Program	Telemonitoring	Cell-enabled or bluetooth enabled cuff	EMR	Auto-generated alerts to patient and provider, virtual consultations, telemonitoring by MFM	Comprehensive educational resources	Mental health, nutrition, and social support services. Prenatal through postpartum.
Maven Clinic Platform	mHealth app	Bluetooth-enabled cuffs	Cloud-based platform, EMR	Auto-generated alerts to patient and provider, virtual care, telemonitoring by care team	Tailored educational resources	Lifestyle coaching, virtual lactation, and mental health support. Fertility and family health support.

Resources and glossary appendix

Programs

- [About the Cuff Kit™](#)
- [Heart Safe Motherhood™](#)
- [Heart Safe Motherhood Guide](#)
- [UPMC Remote Blood Pressure Monitoring Program](#)
- [Babyscripts™ Blood Pressure Monitoring](#)
- [Naima Health MyHealthyPregnancy app](#)
- [Boston Medical Center - Remote BP Monitoring Program by Rimidi](#)
- [The Journey Pregnancy](#)
- [Ouma Health RPM](#)
- [Moms2B](#)
- [CommonSpirit](#)
- [Maven Platform](#)

Tools and resources

- [CDC Hypertension in Pregnancy Change Package](#)
- [An Economic Case for SMBP Monitoring](#)
- [Accelerating Use of Self-measured Blood Pressure Monitoring \(SMBP\) Through Clinical-Community Care Models](#)
- [Self-Measured Blood Pressure Monitoring Program: Engaging Patients in Self-Measurement](#)
- [Tools to Establish a Self-Measured BP \(SMBP\) Monitoring Program](#)
- [It Starts With Mom: March of Dimes education you need from planning to pregnancy to postpartum](#)
- [Low Dose, Big Benefits: March of Dimes education on low dose aspirin use during pregnancy](#)

Glossary

Blood pressure cuff: A medical device used to measure blood pressure, typically consisting of an inflatable cuff to constrict the arm or wrist and a gauge to record the pressure.

Bluetooth enabled BP cuff: Blood pressure monitors equipped with Bluetooth technology can sync data directly to smartphones or other devices, which then transmit the information to healthcare providers via mobile apps or secure online portals.

Cell-enabled BP cuff: A blood pressure monitoring device equipped with cellular connectivity, allowing it to automatically transmit readings to healthcare providers or monitoring platforms without requiring a smartphone, Wi-Fi, or Bluetooth connection. This technology supports remote patient monitoring by ensuring continuous, real-time data sharing, especially in areas where internet access may be limited.

Chronic hypertension: High blood pressure that either predates pregnancy or is diagnosed before 20 weeks of pregnancy. This condition increases the risk of complications during pregnancy, such as preeclampsia.

Cloud-based programs: A cloud-based program involves using cloud technology and cell-enabled at home blood pressure monitors to collect and report readings without requiring the user to have access to a smartphone or internet.

Electronic health record/electronic medical record (EHR/EMR): A digital version of a patient's medical history that can be used by healthcare providers to track health data, including blood pressure trends over time.

Gestational hypertension: High blood pressure that develops during pregnancy after 20 weeks without the presence of protein in the urine or other organ damage. Unlike preeclampsia, it doesn't show signs of organ damage but still requires close monitoring.

Hypertensive disorders of pregnancy (HDP):

A group of conditions characterized by high blood pressure during pregnancy, which includes gestational hypertension, preeclampsia, and chronic hypertension. These disorders can lead to serious complications for both the mom and baby, such as organ damage, preterm birth, and increased risk of cardiovascular disease later in life. Early detection and careful monitoring are essential to prevent adverse outcomes.

mHealth apps: These apps allow patients to record and track their blood pressure readings using their smartphones. Some apps are integrated with electronic health records (EHRs), providing seamless data transmission to healthcare providers.

Normotensive: Having normal blood pressure; not hypertensive or hypotensive.

Postpartum hypertension: Elevated blood pressure that occurs after childbirth, which can be a continuation of a hypertensive disorder during pregnancy or develop after delivery.

Preeclampsia: A pregnancy-related condition characterized by high blood pressure and signs of damage to other organs, such as the liver or kidneys. It typically occurs after 20 weeks of pregnancy and can lead to serious health complications if untreated.

Remote patient monitoring (RPM): A method of healthcare delivery that uses technology to monitor patients outside traditional clinical settings, often used to track blood pressure and other vital signs in pregnancy.

Self-measured blood pressure (SMBP): The practice of individuals measuring their own blood pressure outside of a clinical setting, typically at home, using a personal blood pressure monitor. SMBP allows for more frequent and consistent monitoring, which helps in early detection of hypertensive disorders, managing conditions like preeclampsia, and providing healthcare providers with a more comprehensive view of blood pressure trends over time.

Telehealth-based programs: Telehealth services involve more comprehensive systems where blood pressure readings are automatically transmitted to a centralized monitoring service, which then relays the information to healthcare providers. This can include additional features such as automated alerts and reminders for patients.

Text-based programs: Patients measure their blood pressure at home and send the readings via text messages to their healthcare providers, enabling continuous monitoring and prompt feedback.

Web-based platforms: Patients measure their blood at home with blood pressure monitors that are connected to a digital platform. The data collected is then shared with healthcare providers in real-time, enabling timely interventions and adjustments to treatment plans.

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