Million Hearts®

AAFP
AMERICAN ACADEMY OF FAMILY PHYSICIANS

AMERICAN COLLEGE of NURSE-MIDWIVES

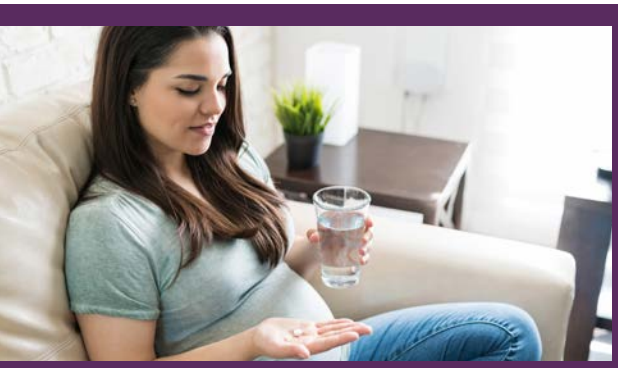
ACOG
The American College of Obstetricians and Gynecologists

ACOOG
American College of Osteopathic Obstetricians and Gynecologists

AMA
AMERICAN MEDICAL ASSOCIATION

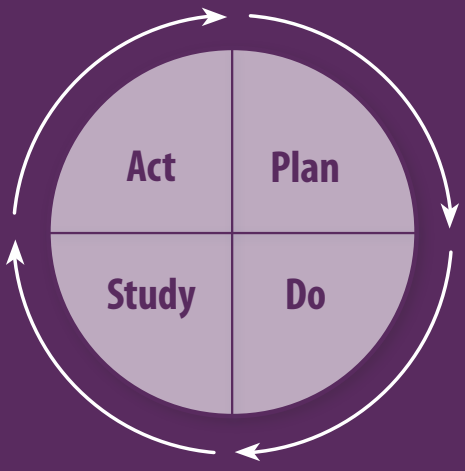
NPWH
The National Association of NURSE PRACTITIONERS in WOMEN'S HEALTH

Society for Maternal-Fetal Medicine



A MILLION HEARTS® ACTION GUIDE

Hypertension in Pregnancy CHANGE PACKAGE



CDC

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[4]American Academy of Family Physicians
[5]American Medical Association
[6]American College of Nurse-Midwives
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Health care settings are shown in **bold font**.

Foreword

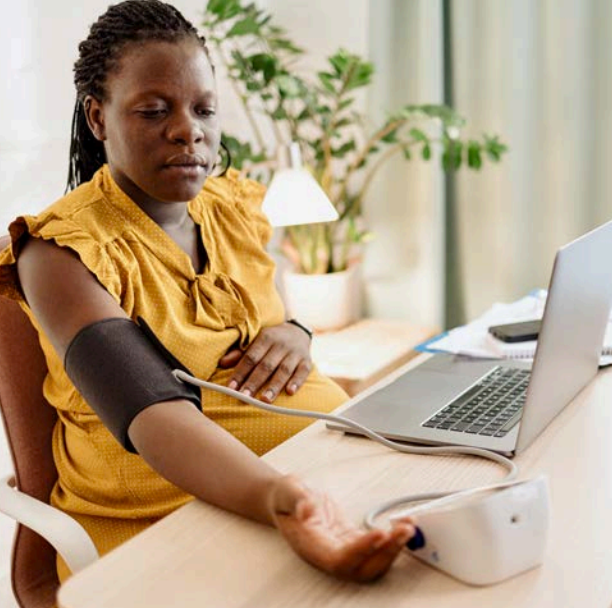
The **Federal Hypertension Control Leadership Council** convened in 2020 in response to the Surgeon General's Call to Action to Control Hypertension to make equitable hypertension control a national priority. Controlling hypertension can save lives, improve health and resilience, and reduce costs. The Council's 12 founding federal agencies and offices work together to inspire, coordinate, and accelerate action to improve hypertension prevention, detection, and control for all.

This is a daunting charge. Hypertension in the United States is common, often uncontrolled, and harmful. Nearly 120 million people, 1 in every 2 U.S. adults, have hypertension, and only 1 in 4 of those adults has it under control. Disparities in both prevalence and control abound. Black adults experience earlier onset of high blood pressure, adding years of harm from elevated pressure. American Indian, Alaska Native, and Black adults and individuals living in rural areas have rates of control below the national average. In everyone, uncontrolled hypertension can lead to heart attacks, strokes, kidney disease, heart failure, dementia, and complications of pregnancy.

Hypertension—before, during, and following pregnancy—is on the rise in the United States. Hypertension in pregnancy not only jeopardizes the lives and health of both mothers and babies but raises their lifetime risk of heart disease and stroke, the first and fifth causes of death in the United States, respectively. Improving the timely detection and management of hypertension in pregnancy is an investment in health and prosperity for families, communities, and workplaces across the nation.

For these reasons and more that you will read on the following pages, members of the Federal Hypertension Control Leadership Council are proud to support the *Hypertension in Pregnancy Change Package* and its widespread implementation by clinicians, teams, and health systems across the country. This collection of effective, evidence-informed approaches can help accelerate the adoption of what works to prevent harm from hypertension in pregnancy. Thank you for joining us on this mission.

Contents

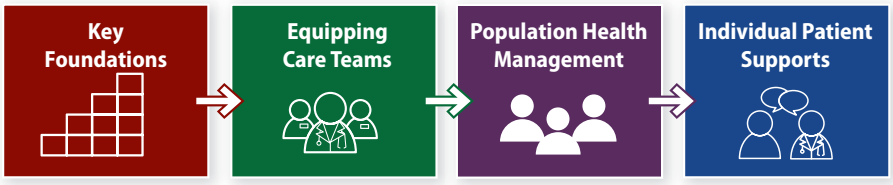


Hypertension in Pregnancy Change Package–Quick Reference

The *Hypertension in Pregnancy Change Package* is a guide to help outpatient clinical settings put systems in place to improve the care they provide for women with hypertension in pregnancy. It provides resources tailored for outpatient care of pregnant women and women of reproductive age, including strategies related to

- Identification of chronic hypertension in women of reproductive age and early pregnancy
- Early diagnosis of gestational hypertension and preeclampsia
- Prevention of preeclampsia with aspirin prophylaxis in patients at higher risk
- Prescription of antihypertensive treatment when indicated
- Rapid escalation of care for severe hypertension in pregnancy
- Postpartum counseling on warning symptoms, long-term cardiovascular risk, prevention strategies, and reproductive life planning and contraception
- Establishing effective transitions of care to support lifelong cardiovascular risk counseling and management

Focus Areas



Change Concepts and Change Ideas

Key Foundations
Make HTN in Pregnancy Identification and Management a Practice or System Priority>>
Designate a practice or health system champion to lead quality improvement efforts for HTN in pregnancy
Involve all team members in addressing HTN in pregnancy
Expand the care team to include community health workers, community pharmacists, and/or doulas
Train all patient-facing staff on recognizing warning signs and escalation of care
Ensure care team engagement by providing education on HTN in pregnancy and role of health care team
Establish policy of care transitions from pregnancy care to primary care and/or cardiology for long-term management of HTN and cardiovascular risk
Redesign clinical spaces to support proper BP measurement technique
Incorporate Quality Metrics for HTN in Pregnancy Into Organizational Strategic Plans>>
Develop quality metrics for HTN in women of reproductive age
Develop quality metrics for HTN management in pregnancy and the postpartum period
Develop quality metrics for long-term cardiovascular disease risk mitigation in women with history of HTN in pregnancy
Prioritize Ease of Access to Care>>
Provide BP checks without appointment or co-pay
Assist pregnant women with health insurance enrollment
Incorporate virtual appointments/telemedicine when appropriate, such as in follow-up of SMBP readings
Implement a Policy or Process to Address BP for Every Patient at Every Visit>>
Develop policies and procedures to reflect prioritization of HTN diagnosis and management
Develop a process for appropriate testing for women with HTN in pregnancy, including target organ damage, secondary causes of chronic hypertension, and preeclampsia
Develop a flowchart/workflow for proactively tracking and managing women with HTN in pregnancy
Overcome diagnostic and clinical inertia using algorithms and protocols specific to HTN in pregnancy
Develop a policy for aspirin prophylaxis in pregnancy
Develop a policy or process for immediate escalation of care/treatment of severe HTN/preeclampsia with severe features
Promote a Culture of Safety for Continued Process Evaluation and Improvement>>
Perform debriefs and case reviews of complex cases and complications
Perform regular simulation drills for severe HTN
Prioritize Respectful, Culturally Sensitive Care>>
Assess organizational capacity to deliver equitable, respectful patient care
Implement policies or processes to train all patient-facing staff in respectful and culturally safe communication, being mindful of communication needs and various family structures and cultural practices

HTN = hypertension; SMBP = self-measured blood pressure; SDOH = social drivers/determinants of health; BP = blood pressure

Equipping Care Teams
Train and Evaluate Direct Care Staff on Accurate BP Measurement and Documentation>>
Adopt a clinician/staff training policy to train and retrain staff on BP measurement
Provide guidance on measuring BP accurately
Assess adherence to proper BP measurement technique
Train Direct Care Staff on Interpretation of BP Measurements and Diagnosis of HTN in Pregnancy>>
Provide guidance on diagnosis and classification of HTN in pregnancy
Use algorithms/flowcharts for management of HTN in pregnancy, including recognition of severe HTN
Train Care Teams on Appropriate Laboratory Assessment Related to HTN in Pregnancy>>
Provide guidance on laboratory tests indicated for chronic HTN, including assessment for end-organ damage and secondary HTN
Provide guidance on laboratory testing for preeclampsia, including urine protein measurement
Equip Care Teams to Provide Appropriate Medications>>
Train staff on indications for antihypertensive therapies in pregnancy and postpartum
Provide guidance on selection of preferred antihypertensives in pregnancy and lactation
Train staff on indications for aspirin prophylaxis during pregnancy to prevent preeclampsia
Use checklists, algorithms, and decision trees to ensure aspirin prophylaxis is prescribed for all pregnant women who meet indications
Facilitate access to prescription medications
Provide guidance and access to safe contraceptive options
Equip Care Teams for Timely Escalation of Care for Treatment of Acute Severe HTN in Pregnancy>>
Use algorithms and checklists for identification of severe HTN and next steps
Develop a plan for escalation of care and/or emergency transport
Equip Care Teams to Manage Immediate and Long-Term Cardiovascular Risk in Women With HTN in Pregnancy>>
Provide supports for managing cardiovascular risk in women with HTN in pregnancy
Employ checklists for addressing cardiovascular risk related to HTN in pregnancy
Equip Direct Care Staff to Facilitate Patient Self-Management>>
Train staff on motivational interviewing techniques and development of a shared action plan for lifestyle counseling
Ensure care team is skilled in supporting patient medication adherence
Put a prevention, engagement, and self-management program in place
Establish a Self-Measured Blood-Pressure (SMBP) Monitoring Program>>
Make the case to the care team and practice leadership that SMBP is a useful tool for select women with HTN in pregnancy
Assign care team roles for an SMBP monitoring program and adapt the workflow accordingly
Provide patients guidance on selecting an SMBP monitor
Develop an SMBP monitor loaner program
Train patients on SMBP monitor use and proper preparation and positioning
Develop a process for handling patient-generated BP readings
Incorporate virtual appointments/telemedicine for follow-up/counseling
Prepare the Care Team Beforehand for Effective HTN Management During Encounters>>
Use a flowchart/dashboard with care gaps highlighted in team huddles to help care teams better support patients
Implement pre-visit planning into workflows and use clinical decision support tools to ensure indicated orders/actions occur during the visit
Promote Effective Communication Among Team Members, Specialties, and Sites of Care>>
Utilize communication tools for handoffs, escalation of care, and event reporting
Provide a system for coordination of care among clinicians/specialties
Provide Clinician- and System-Level Feedback on Progress and Impact>>
Set and communicate specific, measurable performance and quality goals
Monitor outcomes/process metrics

Population Health Management
Identify Women With Potentially Undiagnosed HTN>>
Establish clinical criteria to define potentially undiagnosed HTN
Search electronic health record (EHR) data for patients who meet the established clinical criteria
Implement a plan to confirm HTN status and treat as appropriate
Ensure accurate coding and diagnosis of pregnancy and HTN in pregnancy
Use a Registry to Track and Manage Patients With HTN>>
Implement a HTN registry for pertinent patient populations
Use a defined process for outreach (phone, mail, email, text message) to women with HTN in pregnancy
Use Clinician-Managed Protocols for Medication Adjustments and Lifestyle Recommendations>>
Use protocols to cover proactive outreach driven by registry use and respond to patient-submitted home BP readings
Use Practice Data to Drive Improvement>>
Determine HTN control and related process metrics for the practice
Regularly provide a dashboard with BP goals, metrics, and performance
Individual Patient Supports
Provide Patient Education on HTN in Pregnancy>>
Provide women and their support systems with educational materials on HTN in pregnancy
Educate women and their support systems to recognize and seek immediate attention for warning signs of HTN in pregnancy and serious acute cardiovascular events in pregnancy and the postpartum period
Provide patient education on aspirin prophylaxis to prevent preeclampsia for pregnant women at higher risk
Prepare Patients Before the Office Visit via Pre-Visit Patient Outreach>>
Contact patients to confirm upcoming appointments and provide instruction on how to prepare for their visit
Optimize Patient Intake to Support HTN Management>>
Provide patients with tools to support their visit agenda and goal setting
Measure, document, and repeat BP correctly as indicated; flag abnormal readings
Reconcile medications patient is actually taking with the EHR medication list
Optimize the Patient–Clinician Encounter>>
Use documentation templates to help capture key data such as patient treatment goals and barriers to adherence
Use order sets and standing orders to support evidence-informed and individualized care
Assess medication adherence
Counsel on HTN in pregnancy by using communication techniques
Assess patients' social drivers/determinants of health (SDOH)
Optimize the Encounter Closing>>
Provide patient supports and resources related to identified SDOH
Provide patients with a written self-management plan, visit summary, and follow-up guidance at the end of each visit
Follow Up to Monitor and Reinforce HTN Management Plans>>
Assign staff responsibility for managing refill requests by refill protocol
Implement frequent follow-ups (e.g., emails, phone calls, text messages) with patients to ensure they are taking medication as directed, using SMBP, and scheduling appointments
Use all staff touchpoints to support BP goals and follow up
Support Patients With HTN in Pregnancy in Self-Management During Their Routine Daily Activities>>
Provide patient supports for medication adherence
Provide patient supports for SMBP monitoring
Provide patient supports for increasing physical activity
Provide patient supports for dietary changes
Provide patient supports and resources related to mental health and well-being
Provide patient supports on benefits of breastfeeding for long-term cardiovascular health
Provide patient supports for safe contraceptive options
Provide patient supports for smoking cessation

What Is the Hypertension in Pregnancy Change Package?

The Hypertension in Pregnancy Change Package (HPCP) is a guide to help outpatient clinical settings put systems in place to improve the care they provide for women with hypertension in pregnancy. Throughout this document, we use the term *women* to encompass a broader group of individuals who have the capacity to become pregnant and may be affected by hypertension in pregnancy. Most of the scientific literature and other publications cited in this document focus on cisgender women; however, we acknowledge the importance of hypertension and the subsequent risk of atherosclerotic cardiovascular disease among transgender, nonbinary, and intersex individuals as well.

The HPCP presents an evidence-informed listing of process improvements with accompanying tools and resources that outpatient clinicians and care team members can implement as they provide care to pregnant women and women of reproductive age with a focus on early identification, optimal management, and prevention of complications of hypertension in pregnancy. The HPCP is composed of **change concepts, change ideas**, and evidence- or practice-based **tools and resources**.

- **Change concepts** are general notions that are useful in the development of more specific ideas for changes that lead to improvement.
- **Change ideas** are specific, actionable ideas for changing a process. Change ideas can be rapidly tested on a small scale to determine whether they result in improvements in the local environment.
- Evidence- or practice-informed **tools and resources** listed with each change idea can be adapted or adopted in a clinical setting to improve identification and management of hypertension in pregnancy.

There is strong evidence that a systematic approach to chronic hypertension management in the general population can significantly improve hypertension-related care processes and outcomes.[1] **The science behind cardiovascular risk reduction related to hypertension in pregnancy is evolving. Although there is a need for definitive data in the pregnant and postpartum population, some evidence-based methods that have demonstrated success in the context of chronic hypertension in the general population may confer benefit.** Furthermore, pregnancy is a period of physiologic hemodynamic stress that offers a unique opportunity to identify future cardiovascular risk at a time when risk reduction earlier in the lifespan can have a great impact.[2–3]

Effective management of hypertension in pregnancy necessitates collaboration among multidisciplinary care teams across both inpatient and outpatient settings. The management of *severe* hypertension in pregnancy in emergency and inpatient settings is addressed by several comprehensive toolkits from professional societies and organizations and state perinatal quality collaboratives (PQCs), several of which are listed in Appendix A. However, the HPCP provides resources tailored for outpatient care of pregnant women and women of reproductive age, including strategies related to

- Identification of chronic hypertension in women of reproductive age and early pregnancy
- Early diagnosis of gestational hypertension and preeclampsia
- Prevention of preeclampsia with aspirin prophylaxis in patients at higher risk
- Prescription of antihypertensive treatment when indicated
- Rapid escalation of care for severe hypertension in pregnancy

- Postpartum counseling on warning symptoms, long-term cardiovascular risk, prevention strategies, and reproductive life planning and contraception
- Establishing effective transitions of care to support lifelong cardiovascular risk counseling and management

Hypertension in Pregnancy and Its Associated Risks

All forms of hypertension in pregnancy are associated with an increased incidence of maternal and neonatal complications, as well as long-term cardiovascular risk factor and disease development.[4–8] Hypertension in pregnancy encompasses chronic (or preexisting) hypertension and pregnancy-associated hypertension, including gestational hypertension, preeclampsia, eclampsia, and chronic hypertension with superimposed preeclampsia or eclampsia. The impacts of pregnancy associated hypertension extend beyond pregnancy and the postpartum period. Research has increasingly shed light on its impact on future health, including associations with earlier onset of sustained chronic hypertension and increased incidence of cardiovascular disease and cardiovascular mortality.[4, 9–10]

The classification of hypertensive disorders of pregnancy (HDP) variably includes chronic hypertension depending on the guidelines and definitions set forth by professional medical societies. Recognizing the substantial impact that all forms of hypertension may have on maternal and fetal/offspring outcomes both in pregnancy and long term, **this document uses the term *hypertension in pregnancy* to include both chronic hypertension and pregnancy-associated hypertension (i.e., gestational hypertension, preeclampsia, eclampsia, and preeclampsia/eclampsia superimposed on chronic hypertension)**.

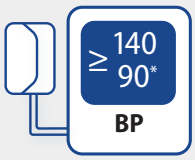
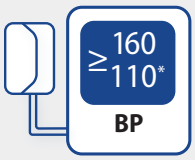
While various guidelines differ on blood pressure (BP) treatment thresholds and targets, currently, there is a general consensus for the definition of hypertension in pregnancy as two or more blood pressure readings during pregnancy of ≥140 mmHg systolic and/or ≥90 mmHg diastolic measured 4 hours apart. Severe hypertension in pregnancy is defined as BP of ≥160 mmHg systolic and/or ≥110 mmHg diastolic measured at least 4 hours apart, though the diagnosis may be confirmed within minutes for treatment purposes. BPs in the severe range that are persistent on measurements at least 15 minutes apart are considered a hypertensive emergency and warrant urgent therapy (**Figure 1**).[11–12]

Burden of Hypertension in Pregnancy on Morbidity and Mortality

The prevalence of hypertension in pregnancy has been rising in recent years, in part due to increased prevalence of risk factors, including obesity, diabetes, and advanced maternal age.[13] Up to 1 in 5 women of reproductive age are affected by chronic hypertension (≥130/80 mmHg), with hypertension in pregnancy affecting 15.9% of delivery hospitalizations.[13,14]

All forms of hypertension in pregnancy are associated with an increased incidence of maternal and neonatal complications, as well as long-term cardiovascular risk factor and disease development.

Figure 1. Hypertension in Pregnancy Definitions[11-12]

Hypertension	Severe Hypertension
 mmHg on two readings ≥ 4 hours apart	 mmHg on two readings
*A diagnosis of hypertension in pregnancy may be made when either the systolic or diastolic threshold is met or exceeded.	
Chronic Hypertension: Hypertension that is preexisting, is diagnosed in the first 20 weeks of gestation, or persists beyond 12 weeks postpartum.	
Pregnancy-Associated Hypertension	
Gestational Hypertension: Hypertension after 20 weeks of gestation with previously normal blood pressure.	
Preeclampsia without severe features: Hypertension after 20 weeks of gestation and previously normal blood pressure with **proteinuria**: • ≥300 mg per 24 hour urine collection • Protein/Cr ratio ≥0.3 • Dipstick reading of 2+ (when other methods unavailable)	**Preeclampsia with severe features (at least one of the following):** • BP ≥160/110* mmHg on two readings • New-onset cerebral or visual disturbance (e.g., new persistent headache, visual changes not due to other causes) • Pulmonary edema • Hepatic dysfunction (transaminases >2 times upper limit of normal) or severe persistent right upper quadrant or epigastric pain unresponsive to medication • Renal insufficiency (Cr >1.1 mg/dL or doubling of serum Cr in absence of other renal disease) • Thrombocytopenia (<100,000 per microliter)
Eclampsia: Preeclampsia with new-onset seizures without other cause.	
Preeclampsia/Eclampsia Superimposed on Chronic Hypertension: Preeclampsia/eclampsia occurring in individuals with pre-existing chronic hypertension.	

BP = blood pressure; Cr = creatinine; mg/dL = milligrams per deciliter

Adverse Pregnancy Outcomes and Pregnancy-Related Mortality

Hypertension in pregnancy increases the risk of adverse pregnancy outcomes such as placental abruption, preterm delivery, low birth weight, fetal growth restriction, and perinatal death, as well as other serious maternal complications, which may occur during pregnancy or in the postpartum period, such as myocardial infarction, stroke, cardiomyopathy, seizures, and death.[4, 16–19]

Hypertension in pregnancy is among the leading causes of pregnancy-related mortality, defined as a death while pregnant or within 1 year of the end of pregnancy from any cause related to or aggravated by the pregnancy. From 2017 to 2019, hypertension in pregnancy caused 6.3% of pregnancy-related deaths.[20] Data from state maternal mortality review committees (MMRCs) indicate that more than 53% of pregnancy-related deaths occurred 1 week to 1 year following the end of pregnancy,[21] highlighting the importance of incorporating strategies for risk counseling and continued monitoring of women with conditions that arise during pregnancy, including hypertension in pregnancy, to continue after 6 weeks postpartum.[22]

Importantly, most of these deaths are considered preventable. MMRCs determine the preventability of pregnancy-related deaths based on data available during case review. Analysis of pregnancy-related mortality in California demonstrated that 100% of deaths attributed to preeclampsia/eclampsia were determined to have at least *some* chance of being prevented, and 60% had a *good-to-strong* chance of being prevented.[23] Furthermore, an analysis of data from four states found that clinician factors, such as missed or delayed diagnosis and the use of ineffective treatments, were identified in nearly two-thirds of preeclampsia- and eclampsia-related deaths.[24] Implementing strategies to enhance early recognition and appropriate management of hypertension in pregnancy may have an impact on these preventable deaths.

Disparities and Health Inequities in Hypertension in Pregnancy

Non-Hispanic Black and American Indian/Alaska Native women experience the highest prevalence of hypertension in pregnancy; approximately 1 in 5 Black women and 1 in 6 American Indian/Alaska Native women have hypertension at delivery hospitalization.[13] Hypertension in pregnancy contributed to a higher proportion of pregnancy-related deaths among Black and American Indian/Alaska Native women compared with White women.[25] In addition to disparities related to race and ethnicity, prevalence of hypertension in pregnancy is also higher for women at least 35 years of age and for women living in the South and Midwest, in rural counties, and in areas with the lowest median household income.[13] **Underlying factors contributing to these disparities include social drivers/determinants of health (SDOH) such as health care access and quality, and structural racism, including systemic racial bias within the health care system**.[26–33] Further, culturally informed, patient-centered, and respectful care that addresses patient communication needs such as health literacy and language barriers can improve engagement and outcomes. Negative maternity care experiences might influence health care utilization; for example, prenatal experiences of racial discrimination have been associated with lower attendance at postpartum visits.[34] Multiple clinical societies and organizations have deemed systemic racism as a root cause of health inequities.[35–39]

Hypertension in pregnancy increases the risk of adverse pregnancy outcomes ... as well as other complications, which may occur during pregnancy or in the postpartum period.

Stratifying clinical data by race, ethnicity, gender, age, insurance status, preferred language, transportation, and other SDOH is an important step to identify care gaps that may contribute to health disparities. Those involved in the care of pregnant and postpartum women can play a key role in achieving health equity in pregnancy-related outcomes by assessing and addressing disparities in hypertension management.

Long-Term Risks for Pregnant Women and Their Children

In addition to serious complications during pregnancy and the postpartum period, hypertension in pregnancy is associated with increased cardiovascular risk later in life for both pregnant women and their children. Pregnancy-associated hypertension, including gestational hypertension and preeclampsia, is associated with earlier onset of cardiovascular disease risk factors, such as chronic hypertension, diabetes, and hyperlipidemia, as well as increased risk of cardiovascular disease including heart failure, ischemic heart disease, and stroke.[40–41] Hypertension in pregnancy is associated with cardiovascular mortality, with a pronounced 1.7- to 3.6-fold increased lifetime risk of cardiovascular mortality associated with preeclampsia.[42] Recognition of the association of preeclampsia and other adverse pregnancy outcomes with future cardiovascular risk has led to their inclusion in guidelines as risk-enhancing factors in cardiovascular disease risk assessment.[43]

Hypertension in pregnancy may also pose long-term risks for the children of affected pregnancies. In utero exposure to hypertension in pregnancy is associated with future risk of hypertension.[44] Studies have also suggested increased risk of stroke and all-cause mortality, particularly in children of pregnancies complicated by early-onset preeclampsia and preeclampsia with severe features.[45–47]

Quality Improvement Opportunities: Improving Prevention, Identification, and Management of Hypertension in Pregnancy

Targeting prevention, identification, or management of hypertension in pregnancy provides good starting points for quality improvement (QI) initiatives on practice- or system-wide levels.

Prevention

Low-dose aspirin (81 mg) for certain pregnant women at higher risk of preeclampsia started between 12 and 28 weeks of gestation, optimally before 16 weeks, and continued daily until delivery has been shown to reduce risk of preeclampsia and related morbidity and mortality and is supported by guidelines.[48–49] Indications for aspirin prophylaxis in pregnancy are detailed in **Figure 2**. Developing a system to identify pregnant women who can benefit from aspirin prophylaxis and promote adherence can be targets for QI initiatives to reduce preeclampsia and related complications.

Identification

Approximately 1 in 5 women of reproductive age have chronic hypertension, many of whom may not be aware of the diagnosis.[14, 50] Well-woman visits are an opportunity to address hypertension in this population.[51] Furthermore, prepregnancy counseling is recommended to provide crucial insights into potential health risks and optimize conditions for a healthy pregnancy.[52–53] If counseling prior to pregnancy is not feasible, pregnancy is a time when women may have better access to and present more regularly for health care and is a valuable opportunity to identify chronic hypertension, perform baseline evaluation, and establish a treatment plan. Early diagnosis of hypertension before or during pregnancy allows for initiation

of lifestyle changes and therapies to reduce the likelihood of complications and depends on timely screening via BP measurement. Studies have shown that in general patient populations, there are nontrivial numbers of patients with multiple elevated BP readings who do not have a diagnosis of hypertension.[54–59] These patients with potentially undiagnosed hypertension have been deemed "hiding in plain sight" and are less likely to be on antihypertensive therapy than their counterparts with a diagnosis.[55, 60] Though there are fewer published studies assessing potentially undiagnosed hypertension in pregnancy, large health systems have identified it as a QI opportunity.[61]

Guidelines recommend screening for hypertension in pregnancy using BP measurements throughout pregnancy at each prenatal visit due to the substantial net benefit and minimal risk of harm.[62] When measuring BP, proper technique is essential to obtain accurate readings (**Figure 3**). It is important to use a BP device that has been validated for accuracy in pregnancy (see Appendix B).[63–64]

Hypertension identified prior to 20 weeks' gestation is consistent with chronic hypertension, hypertension identified after 20 weeks' gestation may be due to gestational hypertension or preeclampsia. Baseline evaluation for these conditions includes[11–12, 65]

- Serum labs including creatinine, blood urea nitrogen, electrolytes, and transaminase levels
- Complete blood count
- Spot urine protein/creatinine ratio or creatinine clearance calculated from 24-hour urine total protein and creatinine
- Electrocardiogram and echocardiogram, when indicated, such as for symptomatic patients

Figure 2. Indications for Aspirin Prophylaxis in Pregnancy[48-49]

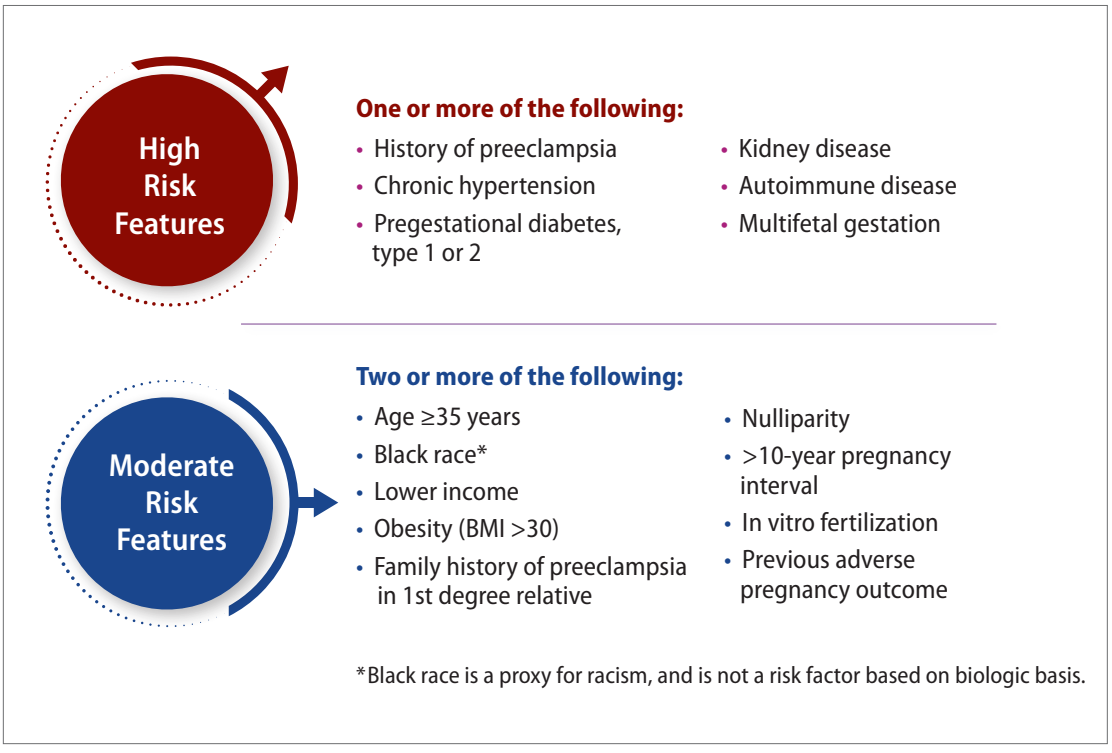
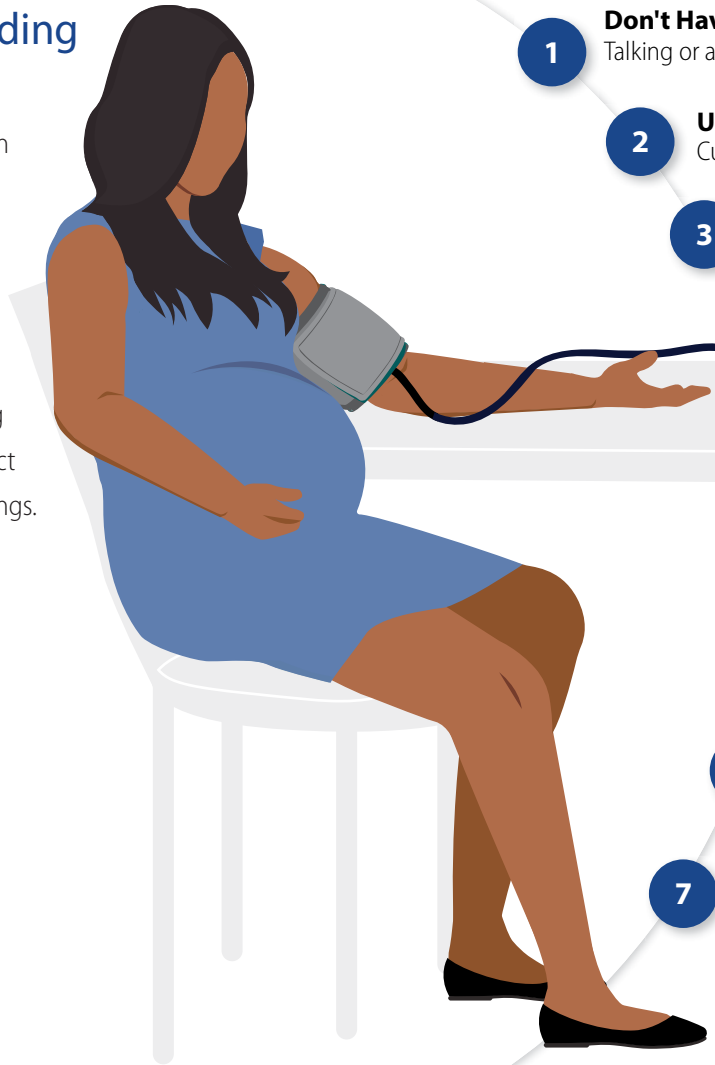


Figure 3. How to Accurately Measure Blood Pressure

7 Simple Tips

To Get an Accurate Blood Pressure Reading

These common positioning errors can result in inaccurate blood pressure measurement. Figure shown is an estimate of how improper positioning can potentially impact blood pressure readings.



1. **Don't Have a Conversation**
   Talking or active listening adds 10 mmHg
2. **Use Correct Cuff Size**
   Cuff too small adds 2-10 mmHg
3. **Put Cuff on Bare Arm**
   Cuff over clothing adds 5-50 mmHg
4. **Support Arm at Heart Level**
   Unsupported arm adds 10 mmHg
5. **Empty Bladder First**
   Full bladder adds 10 mmHg
6. **Keep Legs Uncrossed**
   Crossed legs adds 2-8 mmHg
7. **Support Back/Feet**
   Unsupported back and feet adds 6 mmHg

This **"7 Simple Tips to Get an Accurate Blood Pressure Reading"** was adapted with permission of the American Medical Association and Johns Hopkins University. The original copyrighted content can be found at **www.ama-assn.org/ama-johns-hopkins-blood-pressure-resources**.

Sources:

1. Pickering. et al. Recommendations for Blood Pressure Measurement in Humans and Experimental Animals Part 1: Blood Pressure Measurement in Humans. Circulation. 2005;111: 697-716.
2. Handler J. The importance of accurate blood pressure measurement.

Among those with chronic hypertension, 20–50% of pregnancies progress to superimposed preeclampsia, and half of those with gestational hypertension will develop preeclampsia.[11–12] Thus, for these women, monitoring of BP, symptoms, and laboratory markers, such as urine protein, throughout pregnancy is essential. Implementing algorithms and checklists for monitoring intervals and indicated laboratory studies can help ensure appropriate management. BP monitoring may be achieved through frequent antenatal visits; however, incorporating self-measured blood pressure (SMBP) monitoring for women with elevated BP can be a helpful strategy that engages patients in their care. SMBP is discussed in Appendix B.

Antepartum Management of Hypertension in Pregnancy

Identification of hypertension during pregnancy, as in the general population, should prompt counseling on lifestyle, including recommendations on healthy dietary patterns, physical activity, and recommended weight gain during pregnancy. Antihypertensive medication may be indicated to lower BP and reduce the risk of complications. Pregnant women with hypertension should be counseled on warning signs of preeclampsia and hypertensive emergencies and given clear instructions on when and how to seek medical attention. It's also important that all patient-facing staff, including those who answer phone lines, schedule appointments, and perform patient intake and vital sign measurement, are trained in recognizing symptoms and BP elevations that require prompt escalation of care. Clinicians who care for pregnant and postpartum women should not hesitate to make timely and appropriate referrals to maternal-fetal medicine specialists, internal medical specialists, or cardiologists or a higher level of care facility when indicated.

Use 140/90 mmHg, rather than the previous 160/105–110 mmHg, as either a threshold to initiate treatment or as the upper-limit target BP for chronic hypertension.

For acute-onset severe hypertension, urgent therapy with antihypertensive agents is warranted, and magnesium sulfate may be indicated for seizure prophylaxis. Depending on the gestational age, coexisting maternal conditions, and fetal status, delivery or expectant management with pharmacotherapy may be appropriate.[12] Recognition of severe BP elevation in the outpatient setting is critical and should prompt urgent referral to a higher level of care for management. In outpatient care settings, clear protocols should be in place for escalating care, including arranging transportation.

Management of less severe BP elevation in pregnancy differs by the underlying diagnosis. For gestational hypertension and preeclampsia without severe features, antihypertensive agents are not currently recommended for BP <160/110 mmHg, though evidence for efficacy and safety of a lower treatment threshold is evolving. Guidance for chronic hypertension, on the other hand, was recently updated after results from the Chronic Hypertension and Pregnancy (CHAP) trial were published. This multicenter randomized controlled trial found that women randomized to antihypertensive therapy to achieve a stricter BP target of less than 140/90 mmHg experienced better pregnancy outcomes.[66] These findings informed clinical guidance updates, with recommendations to use 140/90 mmHg, rather than the previous 160/105–110 mmHg, as either a threshold to initiate treatment or as the upper-limit target BP for chronic hypertension.[67–68]

When prescribing antihypertensives in pregnancy, consideration must be given to their safety in pregnancy and lactation. Preferred medications are listed in **Table 1**. Additionally, careful attention should be paid to the potential need for dose adjustments due to changes in metabolism of particular drugs during pregnancy. For women taking medications to manage preexisting chronic hypertension prior to pregnancy, it is advisable to substitute medications with known adverse effects in pregnancy with preferred alternatives.

Table 1. Preferred* Oral Antihypertensive Medications in Pregnancy and Lactation[11, 69]

Preferred Medications in Pregnancy	Starting Dose	Maximum Dose	Precautions and Considerations
First-Line Agents			
Labetalol	100 to 200 mg twice daily	2400 mg per 24 hours	• Asthma, acute decompensated cardiac function, bradycardia • May require three times daily dosing due to increased metabolism during pregnancy
Nifedipine (extended release)	30 mg daily	120 mg per 24 hours	
Methyldopa†	250 mg two to three times daily	3000 mg per 24 hours	
Second-Line Agents			
Hydralazine	10 mg four times daily	300 mg per 24 hours	Reflex tachycardia
Chlorthalidone or hydrochlorothiazide	12.5 mg daily	50 mg per 24 hours	
Clonidine	0.1 mg transdermal daily or 0.1 to 0.3 mg by mouth twice daily	0.3 mg transdermal or 0.6 mg by mouth per 24 hours	Rebound hypertension with abrupt cessation
Preferred Medications in Lactation	**Starting Dose**	**Maximum Dose**	**Precautions and Considerations**
Nifedipine (extended release)	30 mg daily	120 mg per 24 hours	
Enalapril, captopril, benazepril	Varies by agent	Varies by agent	Close follow-up of infant's weight; counsel on contraceptive plan
Labetalol	100 to 200 mg twice daily	2400 mg per 24 hours	Asthma, acute decompensated cardiac function, bradycardia
Hydrochlorothiazide	12.5 mg daily	50 mg per 24 hours	May decrease milk production
Hydralazine	10 mg four times daily	300 mg per 24 hours	Reflex tachycardia

*Many medications used to treat hypertension do not have robust data surrounding their use in pregnancy and breastfeeding. Long-term use of certain medications should be avoided but they may be appropriate to use in a life-threatening emergency. Please consult pharmaceutical references or other guidance for additional considerations.

†There have been recent shortages of methyldopa. As of February 8, 2024, there is only one manufacturer of methyldopa oral tablets in the United States, which could contribute to future shortages. Prescribing clinicians may want to consider an alternative medication or check for active shortages or supply issues.

Postpartum Management of Hypertension

In the postpartum period, elevated BP may persist after a diagnosis of hypertension in pregnancy or may occur without any preceding hypertension. **Most pregnancy-related deaths are preventable. More than 50% occur >7 days to 1 year after the end of pregnancy, and hypertensive disorders of pregnancy are a leading cause**.[21] Thus, it is important for both patients and care providers to recognize and respond to warning signs and severely elevated BP. All pregnant and postpartum patients, particularly those with a history of hypertension in pregnancy, should receive counseling on warning signs for preeclampsia and instructions on when and how to seek medical care. Additionally, SMBP may play a role in the postpartum monitoring of BP for women with a diagnosis of hypertension in pregnancy.[70]

Recommendations for postpartum follow-up of women with hypertension in pregnancy vary, but a pragmatic approach includes SMBP until a visit within 7–10 days after delivery or within 72 hours for those with severe hypertension.[15] Following this initial contact, it is recommended that ongoing care be provided as indicated including a comprehensive postpartum visit within 12 weeks of birth.[22]

The postpartum visit is an excellent opportunity to ensure BP control, assess social drivers of health, and provide counseling on

- Lifestyle factors such as healthy dietary pattern, sodium intake, physical activity recommendations, and smoking cessation
- Pregnancy planning and contraceptive choices, with consideration of risks of estrogen-containing hormonal contraception use in women with hypertension and increased risk for adverse health events as a result of pregnancy
- Lifelong cardiovascular risk and need for establishing primary care for regular follow-up and cardiovascular risk factor screening and management
- Warning signs for serious acute cardiovascular events and how and when to seek medical care

While BP may normalize in the postpartum period in women with pregnancy-associated hypertension, limited data suggest **40–50% of women with pregnancy-associated hypertension have persistently elevated blood pressures at 6 weeks postpartum, and approximately 40% of women with severe preeclampsia have hypertension 1 year postpartum**.[71–74] Persistent hypertension beyond the postpartum period warrants consideration of a diagnosis of chronic hypertension. Lifestyle counseling and pharmacotherapy to achieve BP goals should occur as in the general population to reduce long-term cardiovascular risk. Consideration should also be given to potential secondary causes of hypertension, particularly in women less than 30 years of age, those requiring multiple antihypertensive agents, and those with low-serum potassium so that appropriate targeted therapies may be provided. Refer to the **Million Hearts® Hypertension Control Change Package** for tools and resources on strategies for hypertension control in the general population.

Lifelong Cardiovascular Risk: Counseling and Care Transitions

It is essential that a clinician is identified for ongoing preventive care and cardiovascular risk management for women with hypertension in pregnancy. In general, rates of follow-up for continuity of care are low, resulting in a missed opportunity for cardiovascular risk reduction.[75] Many women may not have an established primary care clinician. Establishing processes to identify a clinician responsible for continuity

of care after pregnancy is crucial, and women should be counseled on the importance of receiving this follow-up care. A clear plan for follow-up, including warm handoffs whenever possible, should be arranged at the postpartum visit with a process for providing women with pertinent aspects of their pregnancy history, such as a patient summary or medical records, to be shared with their primary care clinician and subspecialists for long-term follow-up and cardiovascular risk surveillance and management.

How Can I Use the Hypertension in Pregnancy Change Package (HPCP)?

The HPCP is meant to serve as a menu of options from which practices can select specific interventions to improve diagnosis and management of hypertension in pregnancy. We do not recommend that any practice attempt to implement all of the interventions at once, nor is it likely that all interventions will be applicable to your clinical setting.

Start by bringing together a team of clinicians, administrators, and other interested parties to discuss the aspects of hypertension in pregnancy that are most in need of improvement (see Appendix C for additional quality improvement resources that can be useful in planning improvement activities, like a root cause analysis). The team can then select corresponding interventions from the HPCP that best address those issues.

Figure 4 provides the Institute for Healthcare Improvement (IHI) Model for Improvement.[76] The model suggests posing three questions:

1. What are we trying to accomplish?
2. How will we know that a change is an improvement?
3. What changes can we make that will result in improvement?

Figure 4. Institute for Healthcare Improvement (IHI) Model for Improvement[76]

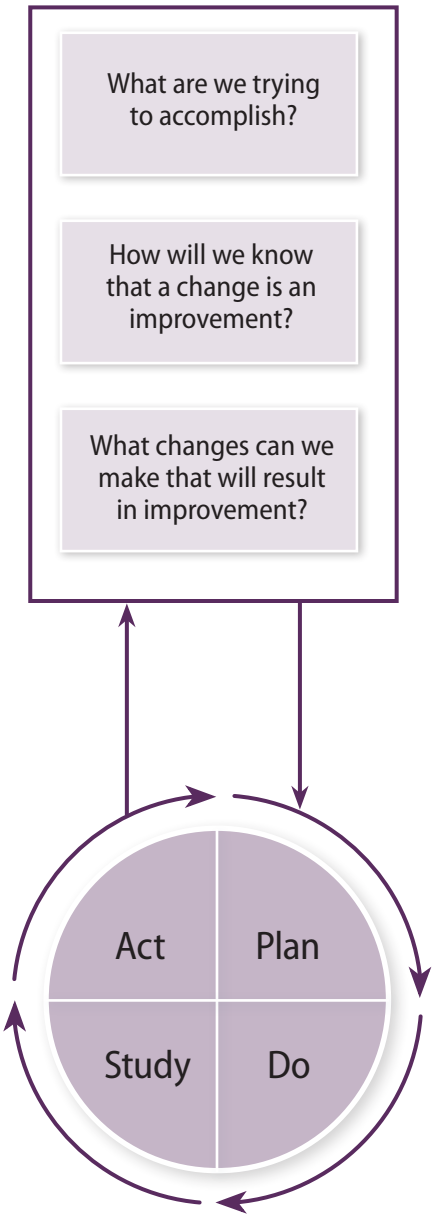
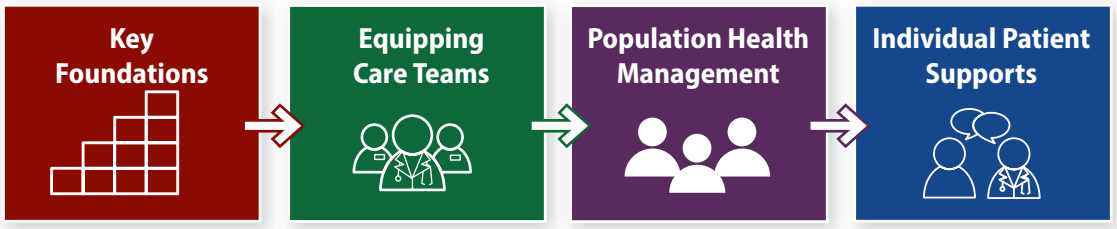


Figure 5. Hypertension in Pregnancy Change Package Focus Areas



The answers to these questions will help identify specific quality improvement objectives and related metrics, and you can choose corresponding change ideas from the HPCP that align with your objectives. Each strategy you choose should first be tested on a small scale (i.e., with "small tests of change") to assess feasibility and allow the team to evaluate and adjust before instituting the change on a broader, more permanent scale. This approach can be accomplished using **Plan-Do-Study-Act (PDSA) cycles**.

The HPCP is broken down into four focus areas: key foundations, equipping care teams, population health management, and individual patient supports (**Figure 5**).

Tables 2–5 contain a list of change concepts and change ideas relevant to hypertension in pregnancy that clinicians and practices have successfully implemented to improve hypertension management. Each change idea is paired with several tools and resources suggested by experts in the field who have successfully used them. See the acknowledgements and contributors page for content contributors.

- **Key Foundations** (Table 2) offers ways to establish practice foundations for effective hypertension in pregnancy management efforts and is likely the best place to focus initial quality improvement efforts. This includes identifying a champion to provide leadership on focused quality improvement efforts and making hypertension in pregnancy management a practice priority.
- **Equipping Care Teams** (Table 3) lists strategies related to training and preparing clinicians and other care team members to focus on hypertension in pregnancy management. Strategies include supporting patient medication adherence and other forms of self-management.
- **Population Health Management** (Table 4) presents population management tools and approaches to proactively monitor and manage hypertension in pregnancy on a practice level. Tools and approaches include clinician-driven treatment protocols and using practice data to drive improvement.
- **Individual Patient Supports** (Table 5) lists ways that practices can support individual patients to better manage their hypertension. These supports span the patient care spectrum, including pre-visit patient outreach, check-in opportunities, interactions during the visit, checkout, and after-visit reinforcement.

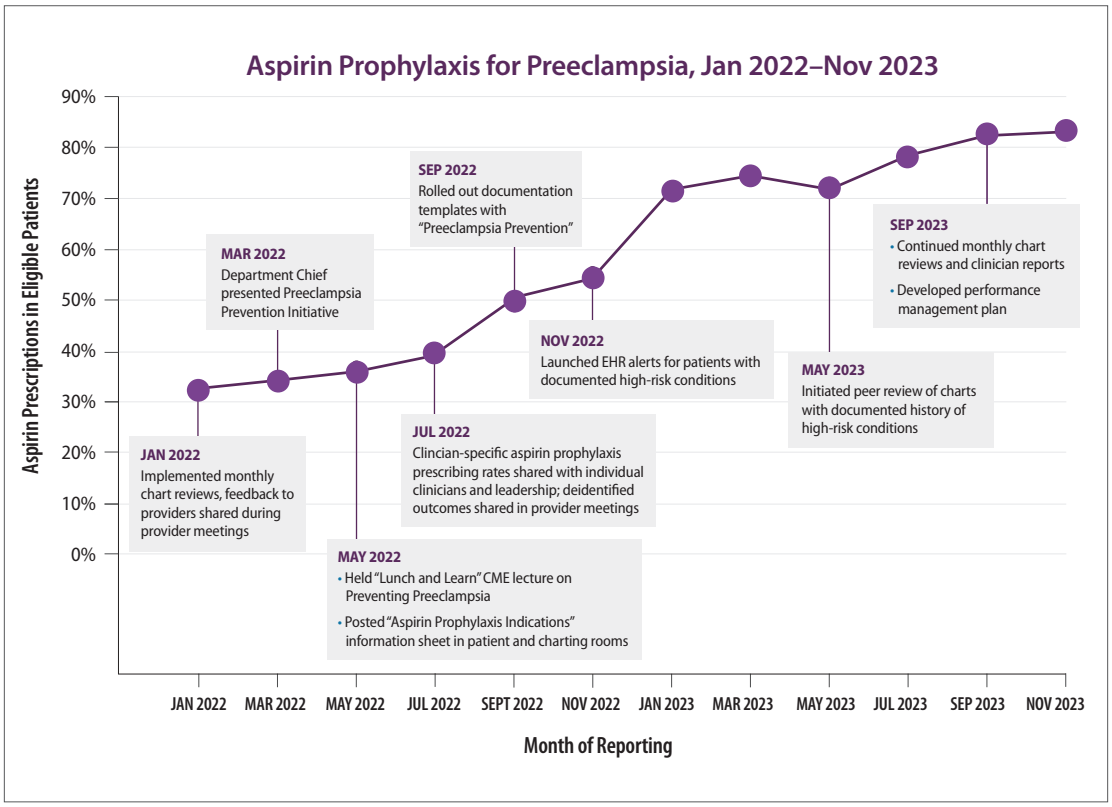
How to Measure Quality Improvement Efforts

It is essential to monitor and measure QI efforts—both outcomes and processes. Overall outcomes such as improved BP control (see Appendix D for more information on clinical quality measures) are important to measure, but it is also important to monitor process measures, such as the percentage of pregnant women at higher risk of preeclampsia who are prescribed aspirin prophylaxis. These types of data can provide much-needed feedback on whether the interventions you are using are being consistently implemented.

Begin by collecting baseline data on a process that you are interested in improving. Then test your "change ideas" on a pilot scale using a small number of patients and discuss identified potential barriers to implementation with staff. These small tests of change can be used to assess the success of implementing an intervention and allow staff to make needed refinements prior to scaling up the project to a larger level.

A helpful tool for displaying and monitoring efforts over time is a run chart, a graph that displays performance on a given process or outcome longitudinally. It can be useful to chart performance over time to inform decision makers and other interested parties of the reasons recommended changes are needed. You can then document when specific changes were made to show the impact that implemented changes yielded on performance (**Figure 6**). See Appendix C for additional QI tools and resources.

Figure 6. Example of a Run Chart



Change Concepts, Change Ideas, and Tools and Resources

Bold font indicates health care settings that contributed content.

Table 2. Key Foundations

Change Concepts	Change Ideas	Tools and Resources
Make HTN in Pregnancy Identification and Management a Practice or System Priority	Designate a practice or health system champion to lead quality improvement efforts for HTN in pregnancy	• Call to Action: Maternal Health and Saving Mothers: A Policy Statement From the American Heart Association. Mehta LS, et al., 2021.[77] • Promoting Risk Identification and Reduction of Cardiovascular Disease in Women Through Collaboration With Obstetricians and Gynecologists: A Presidential Advisory From the American Heart Association and the American College of Obstetricians and Gynecologists. Brown HL, et al., 2018.[2]
	Involve all team members in addressing HTN in pregnancy (e.g., primary care and obstetric clinicians, nursing staff, front desk staff, administrators, social workers)	• AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 7: All Team Members Trained in Importance of BP Goals and Metrics • Community Preventive Services Task Force—Guide to Community Preventive Services: Heart Disease and Stroke Prevention: Team-based Care to Improve Blood Pressure Control • **Kaiser Permanente**—Innovative pregnancy care model surrounds mothers with safety net of support • ACOG Committee Opinion No. 736: Optimizing Postpartum Care. McKinney J, et al., 2018.[22] » Table 2. Postpartum Care Team • UNC Collaborative for Maternal and Infant Health—Outpatient Hypertension Management 2022: Front Desk/Clinic Call Center Triage Flow Chart for Pregnant/Postpartum Patients with possible Severe Hypertensive Emergency
	Expand the care team to include community health workers, community pharmacists, doulas, and/or patient navigators	• CDC—Advancing Team-Based Care Through Collaborative Practice Agreements: A Resource and Implementation Guide for Adding Pharmacists to the Care Team • Beyond Contraception: Pharmacist Roles to Support Maternal Health. DiPietro Mager N, et al., 2022.[78] • Promising practices and pockets of excellence: Community pharmacists supporting wellness for reproductive-age women. DiPietro Mager N, et al., 2022.[79] • National Alliance of State Pharmacy Associations—Maternal Health Service Set for Pharmacists • Sinai Urban Health Institute, Sinai Health System—Best Practice Guidelines for Implementing and Evaluating Community Health Worker Programs in Health Care Settings • Minnesota Department of Health—Community Health Worker (CHW) Toolkit: A Guide for Employers • Center for Community Health Alignment—CHW Model Best Practice Toolkits: Community Health Worker Model Best Practice Toolkit for Designing, Implementing and Showing Impact

Table 2. Key Foundations (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Make HTN in Pregnancy Identification and Management a Practice or System Priority (continued)	Expand the care team to include community health workers, community pharmacists, doulas, and/or patient navigators (continued)	• Community Preventive Services Task Force—Guide to Community Preventive Services: Heart Disease and Stroke Prevention: Interventions Engaging Community Health Workers • **UConn Health**—Million Hearts® Self-Monitoring Blood Pressure (SMBP) Grant: Pharmacist Consult (slide 9) • Primary Maternity Care—The Connecticut Doula Integration Toolkit • ASPE—Doula Care and Maternal Health: An Evidence Review • Bridging the postpartum gap: Best practices for training of obstetric patient navigators. Yee LM, et al., 2021.[80]
	Train all patient-facing staff on recognizing warning signs and escalation of care	• CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix I. Checklist 7: HDP Education for Administrative Staff • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix D. Preeclampsia Screening Tools • RHNTC—Recognize Postpartum Warning Signs Poster for Non-Obstetrical Clinical Staff [poster] • CDC—Hear Her® Campaign » Urgent Maternal Warning Signs » Healthcare Professionals • GaPQC—Cardiac Warning Watch Badge Buddy • GaPQC—Cardiac Warning Watch [poster] • UNC Collaborative for Maternal and Infant Health—Outpatient Hypertension Management: Front Desk/Clinic Call Center Triage Flow Chart for Pregnant/Postpartum Patients with possible Severe Hypertensive Emergency • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit Webinar: Quality Improvement Opportunities to Improve Recognition of HDP
	Ensure care team engagement by providing education on HTN in pregnancy and role of health care team	• NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix A: Health Center Staff Engagement Material – Hiding in Plain Sight (HIPS), Grace Community Health Center • AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 7: All Team Members Trained in Importance of BP Goals and Metrics • Million Hearts®/NACHC—Learning Lab: Optimizing Use of the Expanded Care Team [video] (may be adapted for pregnant populations) • Preeclampsia Foundation—Resources for Nurses

Table 2. Key Foundations (continued)

Change Concepts	Change Ideas	Tools and Resources
Make HTN in Pregnancy Identification and Management a Practice or System Priority (continued)	Establish policy of care transitions from pregnancy care to primary care and/or cardiology for long-term management of HTN and cardiovascular risk	• Figure 2. Timing of CVD risk factor follow-up within the first year postpartum. Page 28, Poon LC, et al., 2023.[81] • Table 2. Example of Cardiovascular Risk Management After a Hypertensive Disorder of Pregnancy. Page 1370, Spaan J, et al., 2012.[82] • Obstetric Care Consensus No. 8: Interpregnancy Care. ACOG and SMFM. 2019.[83] » Table 2: Specific Health Conditions • ACOG Committee Opinion No. 736: Optimizing Postpartum Care. McKinney J, et al., 2018.[22] » Figure 1. Proposed paradigm shift for postpartum visits » Box 1. Components of Postpartum Care • Longer-term cardiovascular follow-up. Page 204, Roberts JM, et al., 2023.[84] • ACC—Postpartum Hypertension Clinic Development Toolkit: Part II. Clinic models/framework • HRSA—Find a Health Center (multiple languages available)
	Redesign clinical spaces to support proper BP measurement technique	• **Plymouth Family Physicians**—Blood Pressure Lounge • Target: BP—BP Positioning Tool
Incorporate Quality Metrics for HTN in Pregnancy into Organizational Strategic Plans	Develop quality metrics for HTN in women of reproductive age (e.g., pre-pregnancy and inter-pregnancy)	• CMS—CMS165v9: Controlling High Blood Pressure • CMS—CMS22v12: Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented • CMS Quality Payment Program—Quality ID #487: Screening for Social Drivers of Health
	Develop quality metrics for HTN management in pregnancy and the postpartum period	• Society for Maternal-Fetal Medicine Special Statement: Quality metric for timely postpartum follow-up after severe hypertension. SMFM, et al., 2022.[85] » Suggested Quality Indicators. Page B20, Patient Safety and Quality Committee, et al., 2020.[15] • Society for Maternal-Fetal Medicine Special Statement: Prophylactic low-dose aspirin for preeclampsia prevention—quality metric and opportunities for quality improvement. SMFM, et al. 2023.[86] • ILPQC—ILPQC Maternal Hypertension Grand Rounds Slide Set: Maternal Hypertension Data: Patient Follow-Up (slide 84)
	Develop quality metrics for long-term cardiovascular disease risk mitigation in women with history of HTN in pregnancy	

Table 2. Key Foundations (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Prioritize Ease of Access to Care	Provide BP checks without appointment or co-pay	• **Cheshire Medical Center/Dartmouth-Hitchcock**—Patient Instruction for Nurse Clinic Blood Pressure Check
	Assist pregnant women with health insurance enrollment	• APA—Medicaid for Pregnant Women • CMS—Medicaid • KFF—Medicaid Postpartum Coverage Extension Tracker
	Incorporate virtual appointments/ telemedicine when appropriate, such as in follow-up of SMBP readings	• Society for Maternal-Fetal Medicine Special Statement: Telemedicine in obstetrics—quality and safety considerations. SMFM, et al., 2023.[87] » Table 1. Selected applications of telemedicine for obstetrical care » Table 3. Potential quality metrics to evaluate telemedicine programs • AMA—Q&A: Innovating in maternal health to address 3 key factors
Implement a Policy or Process to Address BP for Every Patient at Every Visit	Develop policies and procedures to reflect prioritization of HTN diagnosis and management	• RHNTC—Hypertension Prevention and Control Site Assessment • Box 1. Severe Hypertension During Pregnancy and the Postpartum Period Patient Safety Bundle: Council on Patient Safety in Women's Health Care. Page 349, Bernstein PS, et al., 2017.[88] • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix I. Checklist 1: Prenatal HDP Education for All Pregnant Women • IPQIC—Hypertension in Pregnancy-Ambulatory Readiness Assessment • AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 3: BP Addressed for Every Hypertension Patient at Every Primary Care or Cardiology Visit • AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 8, Tool 5: Standard Work Form, Automatic Omron Blood Pressure (may be adapted for OBGYN settings and other devices) • Promoting Risk Identification and Reduction of Cardiovascular Disease in Women Through Collaboration with Obstetricians and Gynecologists: A Presidential Advisory From the American Heart Association and the American College of Obstetricians and Gynecologists. Brown HL, et al., 2018.[2] • Screening for Hypertensive Disorders of Pregnancy: U.S. Preventive Services Task Force Final Recommendation Statement. USPSTF, et al., 2023.[62]

Table 2. Key Foundations (continued)

Change Concepts	Change Ideas	Tools and Resources
Implement a Policy or Process to Address BP for Every Patient at Every Visit (continued)	Develop a process for appropriate testing for women with HTN in pregnancy, including target organ damage, secondary causes of chronic HTN, and preeclampsia	• ACOG Practice Bulletin No. 203: Chronic Hypertension in Pregnancy. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2019.[11] » Which clinical tests are useful in the initial evaluation of a pregnant woman with chronic hypertension? » Box 2. Tests for Baseline Evaluation for Chronic Hypertension in Pregnancy • ACOG Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2020.[12] » Definitions and Diagnostic Criteria for Hypertensive Disorders of Pregnancy • Duke University School of Medicine—Management of Hypertension Guideline
	Develop a flowchart/ workflow for proactively tracking and managing women with HTN in pregnancy (standard model for follow-up [e.g., telehealth/text reminders])	• NYC DOHMH and HealthyHearts NYC—ABCS Toolkit for the Practice Facilitator: Suggested Workflow for Blood Pressure Control (may be adapted for use in pregnant population) • **Cheshire Medical Center/Dartmouth-Hitchcock**—Primary Care HTN Workflow (may be adapted for use in pregnant populations)
	Overcome diagnostic and clinical inertia using algorithms and protocols specific to HTN in pregnancy	• Duke University School of Medicine—Management of Hypertension Guideline • UNC Collaborative for Maternal and Infant Health—Management of Chronic Hypertension in Pregnancy • BP Management. Supplementary Appendix, Page 10, Tita AT, et al., 2022.[66] • Box 1. Severe Hypertension During Pregnancy and the Postpartum Period Patient Safety Bundle: Council on Patient Safety in Women's Health Care: Recognition and Prevention (Every Patient) and Response (Every Case of Severe Hypertension). Page 349, Bernstein PS, et al., 2017.[88] • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Outpatient Management of Preeclampsia Without Severe Features • Million Hearts® —Elements Associated with Effective Adoption and Use of a Protocol: Insights from Key Stakeholders • Appendix B. Health Care Provider Guidelines for Care of Individuals at Risk for Preeclampsia. Page 212, Roberts JM, et al., 2023.[84]

Table 2. Key Foundations (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Implement a Policy or Process to Address BP for Every Patient at Every Visit (continued)	Develop a policy for aspirin prophylaxis in pregnancy	• ACOG and SMFM—Practice Advisory: Low-Dose Aspirin Use for the Prevention of Preeclampsia and Related Morbidity and Mortality • USPSTF—Aspirin Use to Prevent Preeclampsia and Related Morbidity and Mortality: Preventive Medication • Society for Maternal-Fetal Medicine Special Statement: Prophylactic low-dose aspirin for preeclampsia prevention-quality metric and opportunities for quality improvement. SMFM, et al. 2023.[86]
	Develop a policy or process for immediate escalation of care/ treatment of severe HTN/ preeclampsia with severe features	• ACOG Practice Bulletin No. 203: Chronic Hypertension in Pregnancy. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2019.[11] » Control of Acute-Onset Severe Range Hypertension • ACOG Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2020.[12] » Box 4. Conditions Precluding Expectant Management • ACOG District II—Oral Nifedipine Algorithm • UNC Collaborative for Maternal and Infant Health—Outpatient Bundle for Severe Hypertension; see Response section • UNC Collaborative for Maternal and Infant Health—OB Hypertensive Emergency Nifedipine Task Checklist
Promote a Culture of Safety for Continued Process Evaluation and Improvement	Perform debriefs and case reviews of complex cases	• UNC Collaborative for Maternal and Infant Health—Outpatient Hypertension Management 2022: Sample Debrief Outpatient Hypertension Tool • Council on Patient Safety in Women's Health Care—Obstetric In-Situ Drill Program Manual • Baptist Health College Little Rock—Plus Delta Debriefing Tool • PEARLS Healthcare Debriefing Tool. Bajaj K, et al., 2018.[89] • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix Q Guidance for Rapid Debrief and Sample Form (may be adapted for outpatient setting)
	Perform regular simulation drills for severe HTN	• UNC Collaborative for Maternal and Infant Health—Outpatient Hypertension Simulation Scenario • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy: The Role of Medical Simulation (may be adapted for outpatient setting)

Table 2. Key Foundations (continued)

Change Concepts	Change Ideas	Tools and Resources
Prioritize Respectful, Culturally Sensitive Care	Assess organizational capacity to deliver equitable, respectful patient care	• IHI—Improving Health Equity: Assessment Tool for Health Care Organizations • Project Implicit—Implicit Association Tests • CDC—Hear Her® Campaign: Clinical Resources and Tools » Especially Implicit Bias and Stigma and Health Equity and Cultural Awareness • The Joint Commission—Quick Safety 23: Implicit bias in health care » Especially Safety Actions to Consider
	Implement policies or processes to train all patient-facing staff in respectful and culturally safe communication, being mindful of communication needs and various family structures and cultural practices	• CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Patient Education » Especially Offering COMFORT • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy: Talking with Women and their Families About HDP (slide 58) • Table 5. Definition of Respectful Maternity Care. Page 12, Cantor AG, et al., 2024.[90] • **Northern Health**—Indigenous Health Cultural Safety: Respect and Dignity in Relationships • ACOG Committee Opinion No. 587: Effective Patient-Physician Communication. 2014.[91] • AIM—Revised Severe Hypertension in Pregnancy Implementation Webinar: Infusing Equity & Respectful Care (20:55) • AWHONN—SBAR for Inclusive and Equitable Patient Care

Table 3. Equipping Care Teams		
Change Concepts	**Change Ideas**	**Tools and Resources**
Train and Evaluate Direct Care Staff on Accurate BP Measurement and Documentation	Adopt a clinician/staff training policy to train and retrain staff on BP measurement	• AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 1, Tool 9: Blood Pressure Champion and CDS Education and Auditing (can be adapted to OBGYN settings)
	Provide guidance on measuring BP accurately	• Table 8. Checklist for Accurate Measurement of BP. Page e23, Whelton PK, et al., 2017.[65] • Target: BP—7 Simple Tips to Get an Accurate Blood Pressure Reading • Target: BP—BP Positioning Tool • **Atrium Health Wake Forest Baptist (formerly Cornerstone Health Care)**—How to Take Blood Pressure Properly: The Wrong Way [video] • **Atrium Health Wake Forest Baptist (formerly Cornerstone Health Care)**—How to Take Blood Pressure Properly: The Right Way [video] • **Cheshire Medical Center/Dartmouth-Hitchcock**—Obtaining Accurate Blood Pressure Measurements in the Ambulatory Setting: How do you size a blood pressure cuff? (slides 14-18) • AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 1, Tool 11: Blood Pressure Accuracy and Variability Quick Reference, HealthPartners • Preeclampsia Foundation—Accurate Blood Pressure Measurement • ILPQC—Illinois Maternal Hypertension Initiative Comprehensive Slide Set: Importance of Obtaining Accurate Blood Pressure (slides 36-41)
	Assess adherence to proper BP measurement technique	• Target: BP—Technique quick-check • AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control » Plank 1, Tool 9: Blood Pressure Champion and CDS Education and Auditing Process for New Staff, HealthPartners » Plank 1, Tool 10: Quarterly Blood Pressure Auditing Tool, HealthPartners » Plank 4, Tool 4: Blood Pressure Spot Check, **Kaiser Permanente** » Plank 1, Tool 8: New Employee Blood Pressure Measurement Initial Competency Checklist, HealthPartners • IPQIC—Blood Pressure Competency Checklist
Train Direct Care Staff on Interpretation of BP Measurements and Diagnosis of HTN in Pregnancy	Provide guidance on diagnosis and classification of HTN in pregnancy	• ACOG Practice Bulletin No. 203: Chronic Hypertension in Pregnancy. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2019.[11] • ACOG Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2020.[12] • ACOG—Maternal Safety Bundle for Severe Hypertension in Pregnancy (slides 12-14) • Figure 3. Definitions of Hypertensive Disorders of Pregnancy. Page 1805, Park K, et al., 2021.[69]

Table 3. Equipping Care Teams (continued)

Change Concepts	Change Ideas	Tools and Resources
Train Direct Care Staff on Interpretation of BP Measurements and Diagnosis of HTN in Pregnancy (continued)	Use algorithms/ flowcharts for management of HTN in pregnancy, including recognition of severe HTN	• UNC Collaborative for Maternal and Infant Health—Management of Chronic Hypertension in Pregnancy • UNC Collaborative for Maternal and Infant Health—Outpatient Severe Hypertension Evaluation and Management: ≥20 weeks' gestation • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix B. Suspected Preeclampsia Algorithm • ACOG—Maternal Safety Bundle for Severe Hypertension in Pregnancy (slide 29) • Duke University School of Medicine—Management of Hypertension Guideline • UNC Collaborative for Maternal and Infant Health—Outpatient Severe Hypertension Evaluation and Management: ≤4 weeks Postpartum • UNC Collaborative for Maternal and Infant Health—Outpatient Hypertension Management 2022: Treatment of Severe Range Blood Pressure: The Pregnant Patient • ACC—Postpartum Hypertension Clinic Development Toolkit: Part IV. Postpartum blood pressure management: Approach to Medication Titration
Train Care Teams on Appropriate Laboratory Assessment Related to HTN in Pregnancy	Provide guidance on laboratory tests indicated for chronic HTN, including assessment for end-organ damage and secondary HTN	• ACOG Practice Bulletin No. 203: Chronic Hypertension in Pregnancy. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2019.[11] » Box 2. Tests for Baseline Evaluation for Chronic Hypertension in Pregnancy • Table S3. Secondary causes of hypertension in pregnancy among young women. Supplementary Materials, Page 4, Garovic VD, et al., 2022.[4] • FPQC—Florida Hypertension in Pregnancy Toolkit: Secondary Causes of Hypertension • Table 13. Causes of Secondary Hypertension With Clinical Indications and Diagnostic Screening Tests. Page e30, Whelton PK, et al., 2018.[65] • IPQIC—Ambulatory Preeclampsia Checklist (Chronic Hypertension Management box)
	Provide guidance on laboratory testing for preeclampsia, including urine protein measurement	• ACOG Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2020.[12] » Box 2. Diagnostic Criteria for Preeclampsia • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Proteinuria • IPQIC—Ambulatory Preeclampsia Checklist

Table 3. Equipping Care Teams (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Equip Care Teams to Provide Appropriate Medications	Train staff on indications for antihypertensive therapies in pregnancy and postpartum	• ACOG—Practice Advisory: Clinical Guidance for the Integration of the Findings of the Chronic Hypertension and Pregnancy (CHAP) Study • Society for Maternal-Fetal Medicine Statement: Antihypertensive therapy for mild chronic hypertension in pregnancy—The Chronic Hypertension and Pregnancy trial. SMFM, et al., 2022.[68] • ACC—Under Pressure: Discussion of the CHAP Trial and Management of Hypertension in Pregnancy (webinar) • ACOG Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia. ACOG Committee on Practice Bulletins—Obstetrics, et al., 2020.[12] » Table 3. Antihypertensive Agents Used for Urgent Blood Pressure Control in Pregnancy • ACC—Postpartum Hypertension Clinic Development Toolkit: Part IV. Postpartum blood pressure management
	Provide guidance on selection of preferred antihypertensives in pregnancy and lactation	• See Table 1 above • Table 4. Preferred Agents for Antihypertensive Treatment in Pregnancy. Page 1806, Park K, et al., 2021.[69] • Table 5. Antihypertensives and Breast Feeding. Lower portion of Page 1806, Park K, et al., 2021.[69] • Figure 3. Antihypertensive medications and anticoagulants used during pregnancy. Page e886, Mehta LS, et al., 2020.[3] • ACC—Postpartum Hypertension Clinic Development Toolkit: Part IV. Postpartum blood pressure management: Medication Therapy Options • NICHD—LactMed® Drugs and Lactation Database • MotherToBaby® » Exposure Information Service - Ask Our Experts [phone service] » Cardiology & Lipidology [fact sheets]
	Train staff on indications for aspirin prophylaxis during pregnancy to prevent preeclampsia	• ACOG and SMFM—Practice Advisory: Low-Dose Aspirin Use for the Prevention of Preeclampsia and Related Morbidity and Mortality • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Low-Dose Aspirin for Prevention • CMQCC—Low-Dose Aspirin (LDA) Campaign to Reduce Preeclampsia and Related Preterm Birth (slide set) • Table 1. Risk factors for developing preeclampsia. Page 196, Roberts JM, et al., 2023.[84]
	Use checklists, algorithms, and decision trees to ensure aspirin prophylaxis is prescribed for all pregnant women who meet indications	• OPQIC—Preeclampsia Risk Assessment • OPQIC—Low-Dose Aspirin (81mg) in Pregnancy Decision Tree • OPQIC—LDA Clinical Workflow

Table 3. Equipping Care Teams (continued)

Change Concepts	Change Ideas	Tools and Resources
Equip Care Teams to Provide Appropriate Medications (continued)	Facilitate access to prescription medications	• AMA—Medication Management: Save Time by Simplifying Your Prescribing and Refill Process (may be adapted for pregnant populations)
	Provide guidance and access to safe contraceptive options	• CDC—Summary Chart of U.S. Medical Eligibility Criteria for Contraceptive Use • ACOG District XII—Cardiac Disease and Pregnancy • ACC—Postpartum Hypertension Clinic Development Toolkit: Part VII. Appendices and References: Contraception Appendix • Cardio-Obstetrics Part 5: Contraception and Reproductive Planning for Women With Cardiovascular Disease: JACC Focus Seminar. Lindley KJ, et al., 2021.[92] • RHNTC—Putting the QFP Into Practice Series Toolkit: Contraceptive Counseling and Education • RHNTC—Contraceptive Counseling for a Client With Hypertension [video]
Equip Care Teams for Timely Escalation of Care for Treatment of Acute Severe HTN in Pregnancy	Use algorithms and checklists for identification of severe HTN and next steps	• ACOG—Maternal Safety Bundle for Severe Hypertension in Pregnancy (slide 29) • FPQC—Florida Hypertension in Pregnancy Toolkit: Suspected Preeclampsia Algorithm • UNC Collaborative for Maternal and Infant Health—Outpatient Severe Hypertension Evaluation and Management: ≥20 weeks' gestation • UNC Collaborative for Maternal and Infant Health—Outpatient Severe Hypertension Evaluation and Management: ≤4 weeks Postpartum • UNC Collaborative for Maternal and Infant Health—Outpatient Hypertension Management 2022: Treatment of Severe Range Blood Pressure: The Pregnant Patient • ACOG District II—Oral Nifedipine Algorithm • UNC Collaborative for Maternal and Infant Health—OB Hypertensive Emergency Nifedipine Task Checklist
	Develop a plan for escalation of care and/or emergency transport	• Society for Maternal-Fetal Medicine Special Statement: A maternal transport briefing form and checklist: Box: Sample maternal transport briefing form and checklist. Society for Maternal-Fetal Medicine, et al., 2020.[93] • Maine Center for Disease Control & Prevention—Best Practice Recommendations for Handoff Communication During Transport from a Home or Freestanding Birth Center To a Hospital Setting: Appendix A. Brief SBAR Script for Phone Call Initiating Transport by EMS

Table 3. Equipping Care Teams (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Equip Care Teams to Manage Immediate and Long-Term Cardiovascular Risk in Women with HTN in Pregnancy	Provide supports for managing cardiovascular risk in women with HTN in pregnancy	• CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix I. Checklist 6: Immediate and long-term follow-up Counseling for Women after a HDP Diagnosis • Table 2. Specific Health Conditions. Page B7, ACOG and SMFM, 2019.[83] • Hypertensive disorders of pregnancy and long-term cardiovascular health: FIGO Best Practice Advice. Poon LC, et al., 2023.[81] • NSDPQC—Hypertension Project 2021-2022: Learning Session 1: Follow-up After Discharge • Preeclampsia Foundation—Long Term Impact • Preeclampsia Foundation—Resources for Nurses • Lifestyle Modification for CVD Risk Factor Reduction Among Women With APOs. Parikh NI, et al., 2021.[94] • Figure. Cardiovascular disease assessment in pregnant and postpartum women. Page 200, Roberts JM, et al., 2023.[84]
	Employ checklists for addressing cardiovascular risk related to HTN in pregnancy	• CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix I. Checklist 6: Immediate and long-term follow-up Counseling for Women after a HDP Diagnosis • Table 2. Example of Cardiovascular Risk Management After a Hypertensive Disorder of Pregnancy. Page 1370, Spaan J, et al., 2012.[82] • Figure 6. The Fourth Trimester: From Delivery to 12 Weeks Postpartum. Davis MB, et al., 2021.[41] • Table 2. Specific Health Conditions. Page B7, ACOG and SMFM, 2019.[83] • Appendix B. Health Care Provider Guidelines for Care of Individuals at Risk for Preeclampsia. Page 212, Roberts JM, et al., 2023.[84] • ACC—Postpartum Hypertension Clinic Development Toolkit: Part II. Clinic models/framework: Clinic activities • Table 4. Educational content for persons at risk for preeclampsia. Page 205, Roberts JM, et al., 2023.[84]

Table 3. Equipping Care Teams (continued)

Change Concepts	Change Ideas	Tools and Resources
Equip Direct Care Staff to Facilitate Patient Self-Management	Train staff on motivational interviewing techniques and development of a shared action plan for lifestyle counseling	• Encouraging Patients to Change Unhealthy Behaviors With Motivational Interviewing. Stewart EE, Fox CH, 2011.[95] » Especially OARS: A structure for putting motivational interviewing into practice • FSU Center for Prevention and Early Intervention Policy—Substance Use Disorders in Pregnancy: A Chance to Break the Cycle: Motivational Interviewing – Promoting Healthy Behaviors » Especially The Motivational Interviewing Process • AMA—Motivational Interviewing for Medication Adherence • AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 5, Tool 3: 5As Encounter Form, Mercy Clinics, Inc. • Appendix B. Health Care Provider Guidelines for Care of Individuals at Risk for Preeclampsia. Page 212, Roberts JM, et al., 2023.[84]
	Ensure care team is skilled in supporting patient medication adherence	• Million Hearts®—Improving Medication Adherence Among Patients With Hypertension: A Tip Sheet for Health Care Professionals • NYC DOHMH and HealthyHearts NYC—ABCS Toolkit for the Practice Facilitator: Suggested Workflow for Blood Pressure Control, Medication Adherence Workflow (may be adapted for clinical setting) • AMA—Medication Adherence: Improve Patient Outcomes and Reduce Costs • American College of Preventive Medicine—Medication Adherence–Improving Health Outcomes (particularly Section 6)
	Put a prevention, engagement, and self-management program in place	• California HealthCare Foundation—Helping Patients Manage Their Chronic Conditions (may be adapted for pregnant population)

Table 3. Equipping Care Teams (continued)

Change Concepts	Change Ideas	Tools and Resources
Establish an SMBP Monitoring Program	Make the case to the care team and practice leadership that SMBP is a useful tool for select women with HTN in pregnancy	• Million Hearts®/NACHC—Self-Measured Blood Pressure Monitoring Implementation Toolkit: Planning for SMBP—Determining Your Goals and Priority Population (may be adapted for pregnant populations) • University of Chicago Medicine—Postpartum Telehealth and Remote Patient Monitoring for Preeclampsia • University of Chicago Medicine—STAMPP HTN: Systematic Treatment And Management of Postpartum Hypertension • Million Hearts®—SMBP Forum September 2023 - Community Approach to SMBP in the Maternal Health Space [webinar] • NACDD—Million Hearts® Health Equity Implementation Project: Huddle Up Moms • **UConn Health**—Million Hearts® Self-Monitoring Blood Pressure (SMBP) Grant • Management of Postpartum Hypertensive Disorders of Pregnancy. Comparative Effectiveness Review No. 263. Steele DW, et al., 2023.[96] • AMA—SMBP Coverage Insights: Medicaid
	Assign care team roles for an SMBP monitoring program and adapt the workflow accordingly	• Self-Measured Blood Pressure Telemonitoring Programs: A Pragmatic How-to Guide. McGrath D, et al., 2023.[97] • Million Hearts®/NACHC—Self-Measured Blood Pressure Monitoring Implementation Toolkit: SMBP Monitoring Tasks by Role • NACHC—Self-Measured Blood Pressure Monitoring Implementation Guide for Health Care Delivery Organizations: Diagram 2: SMBP Model Design Checklist and Key Questions • NACHC—Self-Measurement: How patients and care teams are bringing blood pressure to control [video] • AMA—7-steps for SMBP (may be adapted for pregnant populations)
	Provide patients guidance on selecting an SMBP monitor	• AMA—U.S. Blood Pressure Validated Device Listing [filter by populations served: pregnant] • STRIDE BP—Validated Devices For Blood Pressure Measurement In Pregnancy/Preeclampsia • Table 3. Oscillometric blood pressure devices validated for accuracy during pregnancy. Page 19, Ghazi L, Bello NA, 2021.[98] • NACHC—Choosing a Home Blood Pressure Monitor for Your Practice: At-a-Glance-Comparison • Target: BP—Selecting a Cuff Size

Table 3. Equipping Care Teams (continued)

Change Concepts	Change Ideas	Tools and Resources
Establish an SMBP Program (continued)	Develop an SMBP monitor loaner program	• Target: BP—SMBP Patient Training Checklist • NACHC—Self-Measured Blood Pressure Monitoring Implementation Guide for Health Care Delivery Organizations: Appendix Y: SMBP Loaner Program Policy & Procedure – Cleaning and Care of Home BP Monitors, Whitney M. Young, Jr. Health Center • Target: BP—SMBP Loaner Device Agreement • **Open Door Family Medical Centers**—Blood Pressure Monitor Loan Agreement (English and Spanish) • Target: BP—Inventory Management • AMA—SMBP loaner cleaning and disinfection procedure
	Train patients on SMBP monitor use and proper preparation and positioning	• Target: BP—How to Measure Your Blood Pressure At Home infographic • Target: BP—SMBP Patient Training Checklist • AMA—Release the Pressure Self-Measured Blood Pressure Training [video] • Target: BP—SMBP Training [video] (English and Spanish) • Target: BP—SMBP Device Accuracy Test
	Develop a process for handling patient-generated BP readings	• Million Hearts®—Self-Measured Blood Pressure Monitoring: Action Steps for Clinicians: Suggested SMBP Measurement Protocol • AMA—BP Average Calculator • Target: BP—SMBP Average Calculator • Million Hearts®/NACHC—Self-Measured Blood Pressure Monitoring Implementation Toolkit: Optimizing Management of Patient-Generated Health Data for SMBP Programs • Public Health Informatics Institute—Health IT Checklist for Blood Pressure Telemonitoring Software • Weill Cornell Medicine—HTN QI: How to set up blood pressure flowsheet correctly • **WellSpan Health**—Severe Hypertension Treatment and Follow-Up in Pregnancy and the Postpartum: WellSpan Health - Postpartum Blood Pressure Tracking
	Incorporate virtual appointments/ telemedicine for follow-up/counseling	• ACC—Postpartum Hypertension Clinic Development Toolkit: Part V. Clinic example documents, dot phrases, and other materials: New Postpartum Telehealth Visit

Table 3. Equipping Care Teams (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Prepare the Care Team Beforehand for Effective HTN Management During Encounters	Use a flowchart/ dashboard with care gaps highlighted in team huddles to help care teams better support patients	• **Plymouth Family Physicians**—Health Maintenance Table (may be adapted for pregnant populations) • **Plymouth Family Physicians**—Patient-Level Report (may be adapted for pregnant populations)
	Implement pre-visit planning into workflows and use clinical decision support (CDS) tools to ensure indicated orders/ actions occur during the visit	• NSDPQC—Hypertension Project 2022: Learning Session 2: Example of EHR use for ASA Risk Factors • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix C. Figure 1. Event Menu (may be adapted for clinical setting) • NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix O: CDS-Enabled BP Tool – NextGen, Golden Valley Health Centers • NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix P: CDS-Enabled BP Tool – eClinicalWorks, Neighborhood Healthcare
Promote Effective Communication Among Team Members, Specialties, and Sites of Care	Utilize communication tools for handoffs, escalation of care, and event reporting	• CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Response » Especially SBAR-R-R Communication Technique • ACOG Committee Opinion No. 517: Communication strategies for patient handoffs. 2012.[99] • AHRQ—Warm Handoffs: A Guide for Clinicians
	Provide a system for coordination of care among clinicians/ specialties	• ACOG Committee Opinion No. 736: Optimizing Postpartum Care. McKinney J, et al., 2018.[22] » Table 2. Postpartum Care Team » Figure 1. Proposed paradigm shift for postpartum visits • Figure. Cardiovascular disease assessment in pregnant and postpartum women. Page 200, Roberts JM, et al., 2023.[84]
Provide Clinician- and System-Level Feedback on Progress and Impact	Set and communicate specific, measurable performance and quality goals	• WisPQC—Aims/Goals Worksheet
	Monitor outcomes/ process metrics (e.g., track clinic and system performance to provide feedback to clinicians and decision makers)	• MNPQC—Family of Measures, Stratify by race/ethnicity (slide 2) • RHNTC—Hypertension Screening Performance Measure Calculator • NACHC—Self-Measured Blood Pressure Monitoring Implementation Guide for Health Care Delivery Organizations: Appendix Y – HIPS Performance Report/ Care Team Data Monitoring, Golden Valley Health Centers

Table 4. Population Health Management		
Change Concepts	**Change Ideas**	**Tools and Resources**
Identify Women with Potentially Undiagnosed HTN	Establish clinical criteria to define potentially undiagnosed HTN	• Identifying Hypertension in Pregnancy using Electronic Medical Records: The importance of Blood Pressure Values. Chen L., et al., 2020.[61] • An Opportunity to Better Address Hypertension in Women: Self-Measured Blood Pressure Monitoring. Wall HK, et al., 2022.[100] • Patients With Undiagnosed Hypertension: Hiding in Plain Sight. Wall HK, et al., 2014.[60] (may be adapted for pregnant populations) • Table 1. Number of At-Risk Patients Identified by Each Hypertension Screening Algorithm. Page 355, Rakotz MK, et al., 2014.[54] (may be adapted for pregnant populations) • NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix L: Undiagnosed Hypertension Algorithms and Clinical Criteria Decision Points, HIPS Project (may be adapted for pregnant populations)
	Search EHR data for patients who meet the established clinical criteria	• NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix M: Potentially Undiagnosed Hypertension Algorithm used to Generate Registries and Reports - i2i Tracks, Golden Valley Health Centers and Tulare Community Health Clinic (now Altura Centers for Health) (may be adapted for pregnant populations) • Identifying Patients With Hypertension: A Case for Auditing Electronic Health Record Data. Baus A, et al., 2012.[58] (may be adapted for pregnant populations) • **Plymouth Family Physicians**—Patient-Level Report (may be adapted for pregnant populations)
	Implement a plan to confirm HTN status and treat as appropriate	• NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix N: Patient Status and Opportunities Alert – eClinicalWorks, Neighborhood Healthcare
	Ensure accurate coding and diagnosis of pregnancy and HTN in pregnancy	• CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Documenting Maternal Hypertensive Diagnoses with Accurate ICD-10 Coding » Especially Table 1. Frequency of HDP ICD-10 codes at delivery in California • AIM—Severe Hypertension in Pregnancy Patient Safety Bundle (2022): AIM Severe Hypertension in Pregnancy ICD10 Codes List

Table 4. Population Health Management (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Use a Registry to Track and Manage Patients with HTN	Implement a HTN registry for pertinent patient populations	• AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 6: Registry Used to Track Hypertension Patients • ONC—Quality Improvement in a Primary Care Practice (Registry section and figure; may be adapted for pregnant populations)
	Use a defined process for outreach (e.g., phone, mail, email, text message) to women with HTN in pregnancy	• NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix V: HIPS Front Office Script, Golden Valley Health Centers • **Zufall Health**—Instructions to Schedule Follow Up Appointments
Use Clinician-Managed Protocols for Medication Adjustments and Lifestyle Recommendations	Use protocols to cover proactive outreach driven by registry use and respond to patient-submitted home BP readings	• Minnesota Board of Nursing—FAQ: Use of Condition Specific Protocols • Semiautonomous Treatment Algorithm for the Management of Severe Hypertension in Pregnancy. Martin C, et al., 2021.[10] » Especially Figure 1. Semiautonomous treatment algorithm integrated into the electronic medical record system for the treatment of severe hypertension in pregnancy (may be modified for clinical setting)
Use Practice Data to Drive Improvement	Determine HTN control and related process metrics for the practice	• CMS—CMS22v12: Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented • CMS—CMS165v9: Controlling High Blood Pressure (may be adapted for pregnant populations)
	Regularly provide a dashboard with BP goals, metrics, and performance	• **Marshfield Clinic Health System**—Hypertension Referral Dashboard

Table 5. Individual Patient Supports		
Change Concepts	**Change Ideas**	**Tools and Resources**
Provide Patient Education on HTN in Pregnancy	Provide women and their support systems with educational materials on HTN in pregnancy	• CDC—High Blood Pressure • CDC—High Blood Pressure During Pregnancy • ACOG—FAQs: Preeclampsia and High Blood Pressure During Pregnancy • ACOG—Infographic: Preeclampsia and Pregnancy • AHA—Pregnancy and Maternal Health • AHA—Preeclampsia and High Blood Pressure • Preeclampsia Foundation—Preeclampsia Tests English | Spanish • Preeclampsia Foundation—Preeclampsia: a screening test for heart disease • NHLBI—Pregnancy and Your Heart Health • NICHD—Preeclampsia and Eclampsia • CMQCC—CVD Risk Infographic • Preeclampsia Foundation—Heart Disease & Stroke • ABC—A collaborative patient-centered care team can make a difference • March of Dimes—HELLP Syndrome (see page below video) • March of Dimes—Preeclampsia (see page below video) • CardioSmart—Health Problems During Pregnancy Infographic • Preeclampsia Foundation—Signs And Symptoms of Preeclampsia
	Educate women and their support systems to recognize and seek immediate attention for warning signs of HTN in pregnancy and serious acute cardiovascular events in pregnancy and the postpartum period	• CDC—Hear Her® Campaign » Conversation Guide and Palm Card for Pregnant or Recently Pregnant Women (available in multiple languages) » Conversation Guide and Palm Card for Families, Friends, and Partners (available in multiple languages) » Urgent Maternal Warning Signs Educational Materials (available in multiple languages) » Posters and Handouts for American Indian and Alaska Native Communities • ACOG—Infographic: Preeclampsia and Pregnancy • Preeclampsia Foundation—Postpartum Preeclampsia English | Spanish • FPQC—Florida Hypertension in Pregnancy Toolkit: Appendix A: Sample Discharge Sheet for Hypertensive Disorder Patients • Preeclampsia Foundation—7 Symptoms Every Pregnant Woman Should Know [video] English | Spanish • IPQIC—Preeclampsia Patient Education Tool • ACOG—Infographic: Heart Disease and Pregnancy • ACOG—Pregnancy Status Signs in English and Spanish

Table 5. Individual Patient Supports (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Provide Patient Education on HTN in Pregnancy (continued)	Provide patient education on aspirin prophylaxis to prevent preeclampsia for pregnant women at higher risk	• CMQCC—Should I do Aspirin… To Keep Me and My Baby Safe? • March of Dimes—Health Action Sheet: Low-dose aspirin to prevent preeclampsia and premature birth English | Spanish • Preeclampsia Foundation—Ask About Aspirin English | Spanish • CMQCC—To Keep Baby and You Safe from Preeclampsia: Let's Do Aspirin! English | Spanish
Prepare Patients Before the Office Visit via Pre-Visit Patient Outreach	Contact patients to confirm upcoming appointments and provide instruction on how to prepare for their visit	• Washington State Department of Health—Improving the Screening, Prevention, and Management of Hypertension: An Implementation Tool for Clinic Practice Teams. Key Message #1: Building Trust is Critical (may be modified for pregnant populations)
Optimize Patient Intake to Support HTN Management (e.g., check-in, waiting, rooming)	Provide patients with tools to support their visit agenda and goal setting	• Appendix A. Guidelines for Persons At-Risk for Preeclampsia. Page 210, Roberts JM, et al., 2023.[84] • NIH—Pregnancy Action Plan. BMI: Be More Informed
	Measure, document, and repeat BP correctly as indicated; flag abnormal readings	• NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix O: CDS-Enabled BP Tool – NextGen, Golden Valley Health Centers • NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix Q: Blood Pressure Flow Sheet with Red Framed Alerts for Elevated Blood Pressure Readings –SuccessEHS, ARcare/KYcare
	Reconcile medications patient is actually taking with the EHR medication list	• **Jupiter Medical Center**—Medical Reconciliation Form
Optimize the Patient-Clinician Encounter (e.g., documentation, orders, medication adherence assessment, education/ engagement)	Use documentation templates to help capture key data such as patient treatment goals and barriers to adherence	• ONC—Meaningful Use Case Studies: Improving Blood Pressure Control for Patients With Diabetes in 4 Community Health Centers (figures 1, 4, and 5 may be adapted for pregnant populations) • NYC DOHMH and HealthyHearts NYC—ABCS Toolkit for the Practice Facilitator: » eCW - How to Add a Medication Adherence Questionnaire by Creating Structured Data » eCW - External Rx History Check » eCW - Drug Formulary Review » MDLand External Rx History Check » MDLand Medication Adherence: Medication History (Internal) » MDLand Medication Adherence: Medication Reports » MDLand Medication Adherence: Rx Eligibility

Table 5. Individual Patient Supports (continued)

Change Concepts	Change Ideas	Tools and Resources
Optimize the Patient-Clinician Encounter (e.g., documentation, orders, medication adherence assessment, education/ engagement) (continued)	Use order sets and standing orders to support evidence-informed and individualized care	• **Fort HealthCare**—OB Hypertension
	Assess medication adherence	• AMGF—Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control: Plank 4, Tool 1: Morisky Scale, Mercy Clinics, Inc. • Million Hearts®/NACHC—Learning Lab: Motivational Interviewing for Medication Adherence [video] • Million Hearts®/NACHC—Medication Adherence Town Hall [video] • MotherToBaby®—Fact Sheets (available in English and Spanish)
	Counsel on HTN in pregnancy by using communication techniques	• CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Communication Practices: Communication Practices: Debriefing and Offering COMFORT • CMQCC—Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit: Appendix J. Sample Script: Physician Explanation of Hypertensive Disease Process and Management Plan • Preeclampsia Foundation—Educating Patients • AWHONN—SBAR For Inclusive and Equitable Patient Care
	Assess patients' social drivers/determinants of health (SDOH)	• **Intermountain Health**—Social Determinants of Health Care Process Model • NACHC—The PRAPARE Screening Tool (available in multiple languages) • UCSF—Guide to Implementing Social Risk Screening and Referral-making • OPCA—Empathic Inquiry » Patient Support Questionnaire (English and Spanish) » Patient-Centered Social Needs Screening Conversation Guide • ACOG Committee Opinion No. 729: Importance of Social Determinants of Health and Cultural Awareness in the Delivery of Reproductive Health Care. Ades V, et al., 2018.[102] » Table 1. Sample Screening Tool for Social Determinants of Health • AAFP—The EveryONE Project Toolkit: Social Needs Screening Tool

Table 5. Individual Patient Supports (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Optimize the Encounter Closing (i.e., checkout)	Provide patient supports and resources related to identified SDOH	• findhelp.org (formerly known as Aunt Bertha) • AAFP—The EveryONE Project Toolkit: Neighborhood Navigator • AAFP—The EveryONE Project Toolkit: Develop an Action Plan (available in English, Spanish, and several other languages) • National Healthy Start Association—Find Healthy Start Services • USDA—Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) • USDA—Supplemental Nutrition Assistance Program (SNAP) • USDA—Food Distribution Program on Indian Reservations (FDPIR) • HRSA—Find a Health Center (available in multiple languages) • ILPQC—Mapping Tool: Resources/Services in Hospital's Service Area to Address Patients' Social Determinants of Health » Winnebago County resources
	Provide patients with a written self-management plan, visit summary, and follow-up guidance at the end of each visit	• Preeclampsia Foundation—Make a Plan: My Health Beyond Pregnancy • The MotHERS Program—MotHERS Postpartum Health Record • Preeclampsia Foundation—Beyond Pregnancy • ONC—Providing Patients in Ambulatory Care Settings with a Clinical Summary of the Office Visit
Follow Up to Monitor and Reinforce HTN Management Plans (i.e., after visits)	Assign staff responsibility for managing refill requests by refill protocol	• Minnesota Board of Nursing—FAQ: Use of Condition Specific Protocols • University of Texas Medical Branch—Adult Primary Care Prescription Refill Guidelines for Ambulatory Services (may be adapted for pregnant populations)
	Implement frequent follow-ups (e.g., emails, phone calls, text messages) with patients to ensure they are taking medication as directed, using SMBP, and scheduling appointments	• **Zufall Health**—Instructions to schedule follow up appointments • Penn Medicine Department of OBGYN's Heart Safe Motherhood Program—Sample patient and provider interface for automated text messages
	Use all staff touchpoints to support BP goals and follow up	• HIPxChange—BP Connect Scheduler Instructions: Supportive Staff Responses (may be adapted for pregnant populations) • NACHC—Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix V: HIPS Front Office Script, Golden Valley Health Centers

Table 5. Individual Patient Supports (continued)

Change Concepts	Change Ideas	Tools and Resources
Support Patients with HTN in Pregnancy in Self-Management During Their Routine Daily Activities (i.e., outside of the clinical encounter)	Provide patient supports for medication adherence	• Consumer Reports—Drug Safety: Reading Labels and Patient Information • Script Your Future—Online tool for patients to support medication adherence (medication list wallet cards in English, Spanish, and several other languages)
	Provide patient supports for SMBP monitoring	• Table 2. Self-monitoring of blood pressure. Page 202, Roberts JM, et al., 2023.[84] • Appendix A. Instructions for Monitoring Blood Pressure at Home. Page 211, Roberts JM, et al., 2023.[84] • UNC Collaborative for Maternal and Infant Health—Outpatient Bundle for Severe Hypertension: Readiness Resources: Checking Your Blood Pressure at Home English | Spanish • Target: BP—SMBP Infographic: How to measure your blood pressure at home • Target: BP—7 Day Recording Sheet: Self-Measured Blood Pressure • Target: BP—Using a Wrist Cuff to Measure Blood Pressure (not recommended for most patients) • AMA—Release the Pressure Self-Measured Blood Pressure (SMBP) Training [video] • Montana Cardiovascular Health Program—Check Your Blood Pressure [videos] (available in Blackfeet, Cree, Crow [Apsáalooké], Salish, Cheyenne, Nakoda, Dakota, A'ani [White Clay], and Plains Indian Sign Language) • Preeclampsia Foundation—Blood Pressure: Check. Know. Share. » Webpage English | Spanish » Infographic English | Spanish » Blood pressure log English | Spanish • Preeclampsia Foundation—How To Take Your Blood Pressure [video] English | Spanish
	Provide patient supports for increasing physical activity	• CDC—Physical Activity Recommendations for Pregnant and Postpartum Women • ACOG—Exercise During Pregnancy • ACOG—Exercise After Pregnancy FAQ

Table 5. Individual Patient Supports (continued)		
Change Concepts	**Change Ideas**	**Tools and Resources**
Support Patients with HTN in Pregnancy in Self-Management During Their Routine Daily Activities (i.e., outside of the clinical encounter) (continued)	Provide patient supports for dietary changes	• ACOG—Nutrition During Pregnancy • **Brigham and Women's Hospital**—Postpartum Nutrition after Preeclampsia
	Provide patient supports and resources related to mental health and well-being	• HRSA—National Maternal Mental Health Hotline (phone or text service available in English and Spanish) • Postpartum Support International » PSI HelpLine (phone or text service available in English and Spanish) » PSI Online Support Meetings (free, virtual meetings in English and Spanish) • ACOG—ACOG Explains: Mental Health and Pregnancy [video] • Preeclampsia Foundation—Birth Trauma Resources
	Provide patient supports on benefits of breastfeeding for long-term cardiovascular health	• ACOG—Breastfeeding Benefits • **Mass General Brigham**—Understanding the Health Benefits and Challenges of Breastfeeding
	Provide patient supports for safe contraceptive options	• CDC—Effectiveness of Family Planning Methods (figure) • CDC—Contraception • CDC—It's Your Future. You Can Protect It • ACOG—Effectiveness of Birth Control Methods (figure)
	Provide patient supports for smoking cessation	• UNC Center for Maternal and Infant Health—You Quit Two Quit: Patient Education Materials (variety of patient resources in English and Spanish) » Benefits of Being Tobacco Free (available in English, Spanish, and multiple other languages) » We Know You Want to Protect Your Family (available in English, Spanish, and multiple other languages) » Facts About e-Cigarettes (available in English, Spanish, and multiple other languages)

Appendix A: Additional Resources and Toolkits for Hypertension in Pregnancy*

- ACOG Safe Motherhood Initiative: **Severe Hypertension in Pregnancy Bundle** (2020)
- Alliance for Innovation on Maternal Health: **Severe Hypertension in Pregnancy Patient Safety Bundle** (2022)
- Alliance for Innovation on Maternal Health Community Care Initiative (AIM CCI) /National Healthy Start Association: **Community Care to Address Management of Chronic Conditions during Pregnancy** (2023)
- Alliance for Innovation on Maternal Health Community Care Initiative (AIM CCI) /National Healthy Start Association: **Community Care to Address Management of Chronic Conditions during Postpartum** (2023)
- Alliance for Innovation on Maternal Health: **Postpartum Discharge Transition** (2022)
- Druzin M, Shields L, Peterson N, Sakowski C, Cape V, Morton C. **Improving Health Care Response to Hypertensive Disorders of Pregnancy Toolkit** (2021)
- Florida Perinatal Quality Collaborative (FPQC): Hypertension in Pregnancy Toolbox (2016)
- Indiana Perinatal Quality Improvement Collaborative (IPQIC): **Hypertension Tool Kit** (2021)
- Lindley KJ. **Call for Action to Address Increasing Maternal Cardiovascular Mortality in the United States: Strategies for Improving Maternal Cardiovascular Care**. *Circulation*. 2022;145(7):502–504
- Mehta LS, Sharma G, Creanga AA, Hameed AB, Hollier LM, Johnson JC, et al. Call to Action: Maternal Health and Saving Mothers: A Policy Statement From the American Heart Association. Circulation. 2021;144(15):e251–e269

» **Table 1. Existing Evidence-Based Strategies**

*Resources published prior to 2022 do not include the recent recommendations for management of chronic hypertension in pregnancy as informed by the Treatment for Mild Chronic Hypertension during Pregnancy trial.[66] Findings from the trial informed clinical guidance updates, with recommendations to use 140/90 mmHg, rather than the previous 160/105–110 mmHg, as either a threshold to initiate treatment or as the upper limit target BP for chronic hypertension.[67–68]

Appendix B: Self-Measured Blood Pressure (SMBP) Monitoring

In the general population, SMBP, also known as home blood pressure monitoring, defined as measurement of BP outside of the office setting, is an evidence-based, cost-effective way to improve BP control, particularly when combined with clinical support.[100, 103] Recommendations for SMBP in the general population, for both confirming new diagnoses of hypertension and managing medication adjustments, are included in several guidelines and task force recommendations.[65, 104]

However, research on the effectiveness of SMBP in pregnancy on improving outcomes is less robust thus far, in part due to heterogeneity of populations, methods, and outcomes studied. Meta-analyses suggest that SMBP is accurate, feasible, and safe in pregnancy.[105–106] And despite a lack of definitive evidence of improved outcomes, a recent comparative effectiveness review of hypertension management in postpartum women concluded that SMBP may allow for early recognition of hypertension and may address race-based inequities in follow-up.[96] Further, an expert consensus document gave a strong recommendation for SMBP for women at risk of preeclampsia, recognizing the potential benefits, low likelihood of harm, and cost-effectiveness.[84] SMBP combined with telemedicine for women at risk of preeclampsia can also address barriers to attending frequent antenatal care visits in person.[84]

Incorporating SMBP into practice depends on accurate BP measurement and appropriate response to SMBP readings. Below are some important considerations when using SMBP in pregnant or postpartum women.

Arm Circumference

Properly fitting BP cuffs are essential for accurate readings, both in clinical settings and for SMBP.[107] BP cuff sizes are not standardized across or within device manufacturers, so measuring a patient's arm circumference and providing that value to them may help them obtain a properly sized cuff.[108] Pregnancy-associated weight gain could impact arm circumference. As a pregnancy progresses, it may prove helpful to remeasure arm circumference to ensure a properly sized cuff is used, both for in-office measurement and for SMBP.[100]

SMBP Devices Validated in Pregnant Populations

Automatic upper arm devices are preferred to wrist cuffs for most patients. Wrist cuffs can be used for women with very large or conical upper arms, though attention to proper positioning is important for accurate readings.[107, 109] Not all SMBP devices have been clinically validated for use in pregnant women, which is imperative due to increases in blood volume during pregnancy. The **U.S. Blood Pressure Validated Device Listing**, from the American Medical Association, is a reliable source of clinically validated SMBP devices and allows users to filter by pregnant populations. **STRIDE BP**, from the European Society of Hypertension, International Society of Hypertension, and World Hypertension League, is another source of SMBP devices that have been validated in pregnancy.[64, 110]

Proper Preparation and Positioning

It is essential to teach patients how to prepare and position themselves to obtain accurate blood pressure measurements; this is pertinent to in-office measurement as well. Actions that can improve accuracy include (**Figure 3**):

- Having an empty bladder
- Avoiding caffeine and exercise for 30 minutes before measuring
- Sitting in a chair with back supported, feet flat on the floor and arm at heart level
- Placing cuff on a bare arm
- Resting quietly for 5 minutes before measuring
- Not talking, actively listening, or using electronic devices during measurement[107, 109]

Clinical Protocol

SMBP has been shown to be more accurate than in-office readings, in part because SMBP is digested as an average of a pattern of readings. Most experts agree that a typical protocol for diagnosing new cases of hypertension or monitoring medication changes in nonpregnant patients with hypertension is to obtain two readings 5 minutes apart in the morning and two readings 5 minutes apart in the evening for up to 7 days (no fewer than 3 days).[107, 109] This provides up to 28 readings, which are then averaged for a representative blood pressure value.

SMBP Device Coverage

Currently, insurance coverage for SMBP devices is variable in private plans. Forty-two states provide some level of device coverage for Medicaid beneficiaries (as of February 2024), though coverage varies substantially.[111] Medicaid device coverage averages $63.76, but ranges from $8.22 (Arkansas) to $159.44 (New Hampshire). Many clinically validated devices can be purchased for $50–100, but if an extra-large cuff is needed, the device will likely cost $100 or more.[112]

Additional SMBP Resources

- **Million Hearts® SMBP webpage**
- **NACHC SMBP Implementation Toolkit**
- **Self-Measured Blood Pressure Telemonitoring Programs: A Pragmatic How-to Guide**.[97]
- **Target: BP**

Appendix C: Additional Quality Improvement (QI) Resources

If you are new to continuous QI, there are many useful QI tools that can assist you in your efforts. For example, the IHI provides several QI tools that support its Model for Improvement (**Figure 4**). Its **Quality Improvement Essentials Toolkit** is a good primer for those beginning their quality improvement journey. The toolkit includes the **Improvement Project Planning Form** to help teams think systematically about their improvement project and the **PDSA Worksheet for Testing Change**, which walks the user through documenting a test of change. These resources may be helpful for planning, assigning responsibilities, and carrying out small tests of change for improving care of women with hypertension in pregnancy.

Another useful QI reference and toolkit is the **Guide to Improving Care Processes and Outcomes**, available from the Health Resources and Services Administration (HRSA), which supports the U.S. health care safety net. This resource includes worksheets, such as the **Clinical Decision Support-enabled Quality Improvement Worksheet** for analyzing current workflows and information flows and considering improvements for targets such as BP control or aspirin prophylaxis. The HPCP can help identify promising evidence-informed approaches to enhancing care processes to achieve this goal.

Finally, the Healthcare Information and Management Systems Society (HIMSS) publishes a CDS 5 Rights framework on improving care delivery and outcomes with clinical decision support (CDS). These guidebooks can help you apply the **CDS 5 Rights** framework to ensure that all the right people (including patients) get the right information in the right formats via the right channels at the right times to optimize health-related decisions and actions. The guidebooks help health care practices and their partners set up programs that reliably deliver outcome improving CDS interventions. They also provide detailed guidance on how to successfully develop, launch, and monitor such interventions so that all interested parties benefit.

Appendix D: Clinical Quality Measures Related to Hypertension in Pregnancy

Quality improvement efforts are often anchored in clinical quality measures. The Centers for Medicare and Medicaid Services (CMS) Quality Payment Program (QPP) has a specialty measure set included in the 2023 Merit-Based Incentive Payment System (MIPS). It includes 27 measures, four of which are very pertinent to hypertension in pregnancy (**Table 6**). CMS22 assesses BP screening and documentation of follow-up for people with elevated BP. This measure includes pregnant women but does not assess BP treatment or control. CMS165 assesses BP control among people with a diagnosis of essential hypertension but excludes pregnant women from the denominator. MIPS Quality ID #336 assesses postpartum follow-up care but does not include postpartum hypertension screening or management. MIPS Quality ID #487 assesses screening for the social drivers of health but excludes patients under the age of 18, regardless of pregnancy status. These four measures represent opportunities for specification enhancement to better assess aspects of care related to hypertension in pregnancy.

Table 6. Select Measures, Centers for Medicare and Medicaid Services (CMS) Quality Payment Program (QPP) 2023 Obstetrics/Gynecology Specialty Measure Set

Measure Name	Description	Pertinent Exclusions	Notes
CMS22: Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented	Percentage of patient visits for patients aged 18 years and older seen during the measurement period who were screened for high BP and for whom a recommended follow-up plan is documented, as indicated, if BP is elevated or hypertensive	Patients with an active diagnosis of hypertension	Includes pregnant women; does not assess BP control
CMS165: Controlling High Blood Pressure	Percentage of patients 18–85 years of age who had a diagnosis of essential hypertension starting before and continuing into or starting during the first 6 months of the measurement period and whose most recent BP was adequately controlled (<140/90 mmHg) during the measurement period	Pregnant women	Can assess BP control for women in pre-pregnancy, postpartum, and interpregnancy phases; relies on pregnancy reconciliation for an accurate denominator
Quality ID #336: Maternity Care: Postpartum Follow-up and Care Coordination	Percentage of patients who gave birth during a 12-month period who were seen for postpartum care before or at 12 weeks of giving birth and received the following at a postpartum visit: • Breast-feeding evaluation and education • Postpartum depression screening • Postpartum glucose screening for gestational diabetes patients • Family and contraceptive planning counseling • Tobacco use screening and cessation education • Healthy lifestyle behavioral advice • An immunization review and update	Patients who do not have postpartum visits	Does not include postpartum hypertension screening or management; does not explicitly assess care coordination
Quality ID #487: Screening for Social Drivers of Health	Percentage of patients ages 18 years and older screened for food insecurity, housing instability, transportation needs, utility difficulties, and interpersonal safety	n/a	Does not include people under 18 years of age

Acronyms

AAFP	American Academy of Family Physicians
ABC	Association of Black Cardiologists
ACC	American College of Cardiology
ACNM	American College of Nurse-Midwives
ACOG	American College of Obstetricians and Gynecologists
ACOOG	American College of Osteopathic Obstetricians and Gynecologists
AHA	American Heart Association
AHRQ	Agency for Healthcare Research and Quality
AIM	Alliance for Innovation on Maternal Health
AMA	American Medical Association
AMGF	American Medical Group Foundation
APA	American Pregnancy Association
ASPE	Assistant Secretary for Planning and Evaluation
AWHONN	Association of Women's Health, Obstetric and Neonatal Nurses
BP	Blood pressure
CDC	Centers for Disease Control and Prevention
CDS	Clinical decision support
CHAP	Chronic Hypertension and Pregnancy
CMQCC	California Maternal Quality Care Collaborative
CMS	Centers for Medicare & Medicaid Services
EHR	Electronic health record
FPQC	Florida Perinatal Quality Collaborative
FSU	Florida State University
GaPQC	Georgia Perinatal Quality Collaborative
HDP	Hypertensive disorders of pregnancy
HIMSS	Healthcare Information and Management Systems Society
HRSA	Health Resources and Services Administration
HTN	Hypertension
IHI	Institute for Healthcare Improvement
ILPQC	Illinois Perinatal Quality Collaborative
IPQIC	Indiana Perinatal Quality Improvement Collaborative
KFF	Kaiser Family Foundation
MIPS	Merit-Based Incentive Payment System
MMRC	Maternal mortality review committee
MNPQC	Minnesota Perinatal Quality Collaborative
NACDD	National Association of Chronic Disease Directors
NACHC	National Association of Community Health Centers
NHLBI	National Heart, Lung, and Blood Institute
NICHD	National Institute of Child Health and Human Development
NPWH	National Association of Nurse Practitioners in Women's Health
NSDPQC	North and South Dakota Perinatal Quality Collaborative
NYC DOHMH	New York City Department of Health and Mental Hygiene
OBGYN	Obstetrics and gynecology

ONC	Office of the National Coordinator for Health Information Technology
OPQIC	Oklahoma Perinatal Quality Improvement Collaborative
OPCA	Oregon Primary Care Association
PDSA	Plan-Do-Study-Act
PQC	Perinatal quality collaborative
QI	Quality improvement
QPP	Quality Payment Program
RHNTC	Reproductive Health National Training Center
SDOH	Social drivers/determinants of health
SMBP	Self-measured blood pressure
SMFM	Society for Maternal-Fetal Medicine
UCSF	University of California, San Francisco
UNC	University of North Carolina
USDA	United States Department of Agriculture
USPSTF	United States Preventive Services Task Force
WisPQC	Wisconsin Perinatal Quality Collaborative

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